ESPP input to the European Commission on

Circular Economy perspectives for EU water policy and for the Sewage Sludge Directive.

*Context: preparation for a **future Circular Economy Act** (see Ursula Von der Leyen Commission presidency candidacy document July 2024 page 9). This Act should aim to create market demand for secondary materials and establish a single market for waste, with a particular focus on critical raw materials (see Jessica Rockwell, European Environment Commissioner mission letter).*

Resilience and perspectives

The exclusion of fertilisers from the EU's sanctions on Russia illustrates our dependency on imports. Russia today still accounts for around one fifth of EU fertiliser imports (N, P and K) (Eurostat).

'Phosphate rock' (meaning phosphorus in any form: fertiliser, food, chemicals, …) is on the EU Critical Raw Materials List since 2014. It was not considered for possible inclusion into the sub-list of "Strategic" Raw Materials in the 2024/1252 act because this sub-list concerns only electronics, renewable energy and aerospace.

Increasing nutrient recycling (in particular phosphorus) from sewage and from other organic wastes, is key to the resilience of the EU food system.

There is an absence of recent data concerning nutrient potential of sewage and organic wastes compared to current EU fertiliser use, but a study in Sweden Member States suggest that phosphorus from sewage alone could cover nearly half of mineral fertiliser use.

Tighter phosphorus discharge limits and the extension of P-removal requirements in the revised UWWTD will increase the amount of phosphorus potentially available for recycling and reuse in sewage / sewage sludge.

Ambitious "reuse and recycling" targets, under the revised UWWTD, should respond to the EU's objectives of food system resilience and circular economy.

Please refer to ESPP proposals on :

a) **UWWTD targets for Phosphorus "Reuse & Recycling"**

b) **Market pull policies to support nutrient recycling**


ESPP proposals
UWWT P reuse-reco


ESPP proposals
market pull policies.

Competitiveness and cost of sewage sludge management

Water operators do not face market competition as such, but costs of sewage sludge treatment are passed on to consumers (water users) or connected industries, so impacting the overall economy. Cost analysis should assume an objective of climate neutrality for municipal waste water treatment (sludge processing and use can have significant positive or negative climate impacts). It is important also to analyse cost, benefits and risks for farmers for whom (digested/composted) sewage sludge provides a cheap or even zero-cost fertiliser and soil improver (nutrients, organic carbon) subject to consumer/crop purchaser acceptance and compatibility with long term soil health.

Competitiveness analysis should not therefore ask whether sewage-recovered nutrients are "more expensive" than mineral fertilisers, but whether the additional cost for water users is significant compared to total water treatment costs and to benefits of resource-saving, local employment, benefits for farmers and EU resource independence and contamination and acceptance risks.

Implementation of phosphorus recycling technologies for municipal waste water will enable development, testing and demonstration, which can then be transferred to other sectors where implementation is more complex for regulatory or political reasons (e.g. animal by-products and food waste, livestock manure).

Policies to support market uptake of recycled materials from ww treatment

Please see ESPP's position paper, above.
In particular, are important
- support under the **Common Agricultural Policy CAP** of improved nutrient management (balanced fertilisation, respect of local Water Framework Directive and Soil Health objectives), of recycling of nutrients and of use of recycled/recovered nutrients
- **ensuring a level playing field for EU farmers and EU fertiliser producers** (including from secondary sources) by inclusion of nutrients in ETS and an extended CBAM or similar, but also development of mechanisms to ensure similar support for EU export of (primary and secondary) fertilisers, subject to quality and safety obligations.

Greenhouse emissions / carbon management / energy consumption

Sludge management options should be assessed taking into account the objective of energy neutrality for waste water treatment (revised UWWTD) and the wider objective of societal climate neutrality. In particular:
- energy costs of treating, drying, transporting sludge
- energy recovery in thermal treatment (pyrolysis, incineration, use of sludge in cement production)
- carbon benefits of sludge application to land : improvement of soil water and nutrient holding capacity (in poor soils, South European climates), carbon storage for a certain time by application of digested/composted sludge, sludge biochar)
- methane production in sludge digesters
- emissions from sludge storage, treatment, digestion, composting, spreading

Future of sludge valorisation to agriculture

What are the environmental/health risks of ongoing valorisation in agriculture, for soil, surface waters, health (via crops, drinking water), in particular:
- pharmaceuticals and AMR (anti-microbial resistance) ?
- microplastics ?
- industrial chemicals including PFAS?

What solutions to address these challenges ?

What is the "perception" risk to ongoing valorisation in agriculture ?
- what would happen if a major supermarket chain decided overnight to advertise "none of our products are grown in your sewage"?
- how to forestall this possible risk ? Should COM take the lead in establishing an EU dialogue forum between regulators, water the food industry, farmers, supermarkets, NGOs, consumer organisations, scientists ?

Should the Sludge Directive make prior treatment before land use obligatory:
- anaerobic digestion or other energy recovery of all sludge, for methane production, except in small wwtps? (trend in any case, driven by energy prices and green energy policies, so inclusion in Directive may not be useful)
- digestion or composting for all sludge, except in very small wwtps ?
- other stabilisation in other cases, e.g. liming, reedbeds, algae production

Quality control / sludge "certification" systems
- these are currently very different in each EU Member State, and may be perceived in some countries as "industry self-regulating": not independent and with potential for conflict of interest, with possible perception by some stakeholders that the aim is to ensure certification of all sludge with non-demanding and science-based limit values.
- assess the feasibility of some sort of EU level "validation of the certifiers" (similar to 'Notified Bodies' for EU fertilising product certification) and minimum EU requirements for certification methodologies, stakeholder involvement and certification criteria, to ensure coherent environmental protection across Europe and to improve consumer, food industry and farmer confidence (in coordination with above suggested dialogue forum ?)
- EU 'minimum' specifications for organic contaminants, pharmaceuticals, microplastics

Obstacles to circular economy because of "non-mixing" of sewage sludge with other wastes / by-products:
Most operators and circuits today treat sewage sludge separately from e.g. food waste, manure, agricultural by-products. This is because of regulatory obstacles and perception issues. This reduces contamination and regulatory risks for operators, but can lead to significant losses of energy-, environmental- and economic-efficiency (e.g. operation of separate anaerobic digesters and digestate processing and logistics chains).

End-of-Waste for materials recovered from wastewater treatment

This is resolved for fertilising product uses by the EU Fertilising Products Regulation. But the absence of EU End-of-Waste status is an obstacle for recycling to other uses (industry, animal feed) of waste-water derived materials, including:
- algae and biomass grown using sewage or digestates as substrate / input (and extracts thereof)
- recovered minerals for industrial applications ? and for animal feed applications (see below)
- polymers
- fibres
- minerals

- other
See Eureau/LEAF fact sheets (2021) = links included above.

See joint letter signed by over 100 companies and organisations on End-of-Waste obstacles to recycling of materials from wastewaters, 2021: here.

More generally, the current Waste Framework Directive architecture for End-of-Waste does not allow innovation and development of the Circular Economy. Waste status ensures safety and producer responsibility, through traceability obligations but **End-of-Waste needs to be more accessible, responsive and coherent**. At present, EU End-of-Waste is not accessible to most recycled materials (with the exception of use in EU fertilising products via the EU Fertilising Products Regulation) because the EU E-of-W process if very slow and is currently only open to a few types of material. National E-of-W can function effectively, but there is a lack of coherence between Member States and of mutual recognition. Even where the product itself is not intended for export outside the Member State, this lack of coherence and mutual recognition poses a major obstacle to circularity: a technology generating a product in one Member State generates a "waste" in another, effectively preventing roll-out of processes, so hindering development and investment. This is the case for recovery of materials or chemicals from sewage for use in construction, industry, animal feed or other non fertiliser applications.

We suggest that routes should be investigated to maintain the safety, traceability and producer-responsibility protection of "waste" status, but accelerate and make more flexible End-of-Waste status by coordinating national E-of-W decisions and facilitating cross-Europe mutual recognition.

Valorisation of phosphorus in sewage sludge going to agriculture

To address the Critical Raw Material "Phosphate Rock"

- To ensure that phosphorus is optimally used when sewage sludge is spread to land, specify that sewage **sludge must only be applied to fields only according to crop needs and within a balanced fertilisation plan** (for P, but also for N, K, copper, zinc)
- Analyse and take into account the **availability of phosphorus in sewage sludge to crops over the timescale of the crop rotation** (1-5 years). Important, but complex: must take into account climate (P mobilisation, risk of run-off losses from on-farm storage and use), soil characteristics, forms of P in sewage sludge.

Terminology

Market transparency, and so investment and uptake, would be facilitated by **development of CEN standards for definition and assessment of "recycled" and "bio-based" for nutrients** (the carbon-dating methodology specified in CEN standards for "bio-based" plastics are nor technically applicable nor relevant for nutrients). See "Bio-based fertilisers" in ESPP SCOPE Newsletter n°150.

Also, it would be helpful to **clarify the definition of sewage sludge** (ensure coherence between different EU legislations and with Member States) and to **clarify the legal status of "sewage sludge"** (as a waste).

For example, the revised UWWTD (as adopted by Parliament and Council, not yet published) defines (art. 2-15):

"'sludge' means organic and inorganic residue resulting from the treatment of urban wastewater from an urban wastewater treatment plant (excluding grit, grease, other debris and any other screenings and residues from the pre-treatment step);"

Whereas the Sewage Sludge Directive 1986 defines “sludge” as including also residual sludge from septic tanks and similar installations, and residual sludge from “other” sewage plants (but does not define sewage …).

The Commission FAQ for the EU Fertilising Products Regulation HERE provides clarification (Q8.32 What do sewage sludge, industrial sludge and dredging sludge mean?)

Interactions with other regulations

Food policy and diets. The main driver for phosphorus import dependency is diet. Adults need 0.6 – 1 gP/day whereas dietary intake in Europe is 1-2 gP/day (of which most is in natural foodstuffs, only 5-10% in food additives).

Critical Raw Materials. Identification of materials “strategic” to food system resilience has not today been carried out (this was only done in the Critical Raw Materials Act 2024/1252 for electronics, renewable energy and aerospace).

REACH and proposed REACH revision: does chemical policy, in particular chemical testing requirements, adequately address impacts of chemicals on soils / soil organisms / plants via sewage sludge (emphasis tends to be on aquatic toxicity) ? Where a chemical is found to be an obstacle to the wastewater circular economy (e.g. PFAS or remanent flame retardants in sewage sludge, see Eureau position), there is a need to accelerate the process from problem identification to chemical restrictions.

Water Framework Directive: the water basin management plans are the key tool to achieve water quality Status objectives, with local stakeholder engagement. How can the Sewage Sludge Directive provide necessary information and regulatory tools to support definition and implementation of these plans?

Animal Feed Regulations: Feed Regulation 767/2009 Annex II appears to exclude use in animal feeds of pure mineral phosphate chemicals processed from sewage sludge incineration ash. An assessment by Swedish National Veterinary Authority (SVA) for Easymining concludes that this would be safe.

(proposed) Soil Health Directive

EU Fertilising Products Regulation. Sewage derived nutrients are currently excluded from EU fertilising products except for CMC12 (struvite and precipitated phosphates) and ash-recovered nutrients (in particular P) under CMC13. The authorisation of sewage sludge biochars (CMC14) should be considered subject to defining criteria to ensure elimination of PFAS, pharmaceuticals and microplastics, guarantee no chimney emissions and ensure that phosphorus is crop-available (require Annex III phosphorus fertiliser solubility criteria).

Waste Framework Directive - End-of-Waste – see above

Common Agricultural Policy – see above

ETS / CBAM – see above

Organic Farming – accelerate inclusion of recycled fertiliser products into the Organic Farming Regulation annexes

Green Public Purchasing, Ecolabel criteria

Areas where research is needed

Data on nutrient flows: there is no coherent data on phosphorus flows (and so recycling potential) in sewage since K. Van Dijk’s thesis and study of 2015. And nearly no data on potassium or nitrogen flows. Data on organic wastes other than sewage is

even less available (manure, food waste, animal by-products …). It would be useful to engage an update study and regular follow up, in order to provide reliable data both for policy making and monitoring, and to support industry and investment decisions. This coherent with art. 20 of the EU Critical Raw Materials Act which requires EU monitoring of CRM trade flows and obstacles to trade, demand, supply and supply concentration, production, bottlenecks, price volatility. This monitoring information (aggregated) will be made publicly available.

Fate of sewage sludge contaminants: in soil, surface and ground waters, crops, for PFAS, other industrial chemicals, pharmaceuticals, AMR (antimicrobial resistance), microplastics – risk assessment, definition of limit values.

Possible routes to reduce relevant contaminants:
- adjusting wastewater and sludge treatment processes (including composting, anaerobic digestion) to optimise contaminant removal (especially pharmaceuticals)
- upstream reductions – regulation of industrial chemicals (in particular PFAS), separation of source hotspots (e.g. hospitals for pharmaceuticals)

P-recovery upstream of thermal sewage sludge valorisation in cement kilns

Recovery of P_4 (white phosphorus)
- that is, the specific raw material “Phosphorus” (not “Phosphate Rock”)
- from sewage sludge or sludge ash
- see EU Horizon 2020 project Flashphos https://cordis.europa.eu/project/id/958267

Nitrogen recovery
- ammonia “stripping” is a known technology, but generates dilute aqueous solutions appropriate for local use but not economically viable for transport/upgrading (except in locally specific circumstances: user fertiliser industry nearby, available heat for evaporation ..)
- research is needed into possible routes to recover and compress ammonia as bottled gas or in other concentrated forms; into N-recovery from nitrate/nitrate solutions; into impacts of N-recovery on wwtp climate emissions (in particular energy consumption, N_2O)

Pyrolysis / biochar
As an alternative to agricultural valorisation or incineration of sludge
- feasibility of ‘small scale’ implementation (minimise sludge transport)
- offgas and dust emissions ?
- interaction with EU Fertilising Products Regulation (see above)
- crop availability of phosphorus in biochars at temperatures necessary to eliminate organic contaminants
- effectiveness of removal of PFAS, pharmaceuticals, microplastics, other contaminants - under what minimal operating conditions or other criteria ?
- duration of carbon storage in soil ? how to certify this ?