English

(https://ec.europa.eu)

European Commission (https://ec.europa.eu/index_en.htm) >

EUSurvey

✓ **Contribution successfully submitted**

Thank you for your contribution!

Go to Consultation Page (https://ec.europa.eu/info/law/better-regulation/initiatives/green_listing_wsr_en)

Please take a moment to save your Contribution ID: 362625f7-b5f7-4d41-9af3-7676cf90a244
You may need it in the future (e.g. to edit your contribution).

Print (/eusurvey/printcontribution?code=362625f7-b5f7-4d41-9af3-7676cf90a244) Get PDF

Do you want to logout from EUSurvey?

Yes No

ESPP input to EU consultation on 'Green Listing' of wastes. 30th October 2025

https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14712-Green-listing-certain-waste-for-the-purposes-of-shipments-to-recovery-between-Member-States_en

Nutrient recycling is important for EU food security and sustainable agricultural productivity, and a core objective of EU Circular Economy and BioEconomy policies. Nutrient recycling contributes to the EU Farm-to-Fork and Biodiversity Strategy objective to reduce nutrient losses by 50%, objective now integrated into the UN Kunming-Montreal Biodiversity Convention.
Nutrient recycling can reduce the climate footprint of virgin minerals.

For the three main nutrients, non-substitutable for crops, the EU is highly import dependent, so nutrient recycling is vital for EU strategic autonomy:

- Phosphorus: c. 90% EU import dependency, with today still around one third of EU phosphate fertiliser imports coming from Russia (see ESPP eNews n°96) Phosphate Rock is EU Critical Raw Material.
- Nitrogen: the EU imports nearly half its nitrogen fertilisers, and EU production depends on imported natural gas
- Potassium: 80–90% EU import dependency

Transboundary shipment of secondary nutrient materials can be complex or prohibitive. These materials are often classified as "waste" in some Member States (often not consistently between different Member States). Because they are bio-based, these secondary materials are variable, maybe seasonal, often in small and locally disperse quantities, all of which can make documentation complex and disproportionately expensive. Operators, often in agriculture or wastewater sectors, may not be equipped to deal with international waste declarations. Secondary nutrient materials are often 'organic' (containing organic matter) so bulky and susceptible to decompose, so that transport cannot wait until documentation proceeds.

For these reasons, 'Green Listing' of the following wastes would significantly facilitate nutrient recycling and the bioeconomy.
In all cases, the 'Green Listing' should be conditional that the materials are destined for nutrient recovery:

Detail in table below.

Proposed waste to add to 2024/1157 Annex III:	*General specifications*	*Justification: recycling potential*	*Potential nutrients (estimated)*	*Proposed harmonised quality / safety criteria*
<u>In all cases:</u> wastes must be non-hazardous – must be destined for nutrient / minerals recovery.				
Ashes				
All ashes by definition do not pose sanitary risks, generally do not contain organic contaminants (micro-plastics, pharmaceuticals, industrial chemicals ….). Heavy metals are simple to analyse and can be removed in recovery processes (justifying ash transport to processing sites). All ashes are dry, concentrates of minerals (e.g. phosphorus, potassium), compatible with bulk transport over distances. Nutrient recovery from ashes can be optimised (costs CAPEX and OPEX, energy and chemical consumption, valorisation of by-products such as calcium, silicates, iron) in centralised processing units treating ashes from a number of combustion sites, potentially in several countries.				
Sewage sludge incineration ash	Mono-incineration of sewage sludge, or co-incineration with other phosphorus-rich, non-hazardous wastes (e.g. biomass).	Phosphorus recycling/reuse from sewage sludge is required by Urban Waste Water Treatment Directive 2024/3019 art.20.	300 ktP/y (1)	For all ashes: - limits for dioxins+furans and for PAH ; - limit for organic carbon (indicator of complete combustion). For coherence, we propose to use the science-based limits fixed in the EU Fertilising Products Regulation 2019/1009 (CMC13): C_{org} <3%/DM, PAH_{16} <6mg/kgDM, PCDD/F <20 ng/kgDM tox. eq. For ashes with any input other than non-ABP biomass (that is, including for example sewage sludge), require combustion according to IED (Industrial and Livestock Rearing Emissions Directive 2010/75) specifications.
Biomass combustion ash	Ashes from biomass to energy (e.g. wood burning, biofuels), ashes from food industry, feed industry, biorefinery wastes (other than Cat1 ABPs).	Ash nutrient recycling is important for sustainable development of the bioeconomy and biomass-fuelled green energy. These ashes can contain significant levels of phosphorus, potassium.	30–300 ktP/y plus 300–1200 kt K (2)	
Municipal solid waste incineration ash	Where transported for minerals recovery, not for reuse ‘as such’ in e.g. road foundations	Recovery of potassium and other minerals is today operational (e.g. EasyMining)	200 - 1 000 ktK/y (3)	
Cat.1 Animal By-Product disposal incineration ash	Disposal of Cat1 ABBPs by incineration is required by the ABP Regulations. At present, the material is first rendered to Meat and Boine Meal (MBM) then incinerated.	High phosphorus content, low levels of contaminant heavy metals. Implications of EFSA 2025 Opinion ?	10 – 30 ktP/y (4)	

Secondary Fertiliser Materials				
EU Fertilising Product Component Materials	Materials respecting the criteria of (one or more) EU Fertilising Products Regulation CMCs (Component Material Category) and for which the recipient company has obtained FPR CE-Certification covering this input material.	The FPR provides EU End-of-Waste status only when the final fertilising product is certified and labelled, so CMCs are often transported as 'waste'. One or more component materials from different Member States may be integrated into the final fertilising product, packaged, labelled and CE-mark Certified.	315 ktP/y [5]	The FPR CMC criteria ensure quality and safety for use in fertilisers.
Materials which are authorised for use as 'National' fertilisers in the recipient Member State.	Materials respecting the criteria of the national fertilisers regulations of the recipient country and for which the recipient company has obtained national certification or registration or equivalent for sale of the material as a fertiliser or as a component of a fertiliser.	If the recipient country national fertiliser category is not 'mutually recognised' by the sender country, or by countries crossed during transport, then the material must be transported as 'waste'		The recipient country fertilisers regulations ensure quality and safety for use in fertilisers.
Bio-Based Streams				
Wastes, wastewaters and sludges from processing of plant materials; from production of human foods or animal feeds, bio-fuels, bio-materials (biochemicals, biofibres) and from biorefineries.	To ensure safety: specify that no chemicals used in the processing should be biocides or be Classified for chronic health or environmental effects. Exclude Cat1 Animal By-Products.	Significant revalorisation potential for nutrients (phosphorus, nitrogen, potassium, micronutrients), organic carbon. Expected growth with development of Bioeconomy and Circular Economy.	130 ktP/y [6]	Where inputs include animal by-products, specify pathogen limits (E. coli).
Aquaculture sludges, including after processing (digestates, ashes …)	Nutrient-rich sludges collected from onshore and offshore aquaculture systems (fish, crustaceans, shellfish).	Significant phosphorus recycling potential.	50 ktP/y [7]	Specify pathogen limits.

Nutrient-Rich Process Streams				
Fire extinguishers and wastes resulting from their refilling.	Fire extinguishers must be emptied and refilled regularly to ensure that they function effectively, resulting in Expired Fire Extinguisher Powder (EFEP) waste.	For standard ABC extinguishers, this consists mainly of ammonium phosphates and ammonium sulphates, potentially recyclable to fertilisers or industrial chemicals (see ESPP eNews n°97)	11 ktP/y [8]	Should cover: fire extinguishers transported for refilling/refurbishment or for end-of-life disposal and also extracted fire extinguisher powders destined for recycling.
Phosphorus-containing metal processing liquors and 'spent' phosphoric acids.	From processes using phosphoric acid	Potential for phosphorus recycling. For economic recovery, re-purification and removal of heavy metals, need to transport to a phosphate industry site (few in Europe, often in a different Member State).	20 – 45 kt P/y [9]	Specify minimum phosphorus content.
Batteries and battery processing wastes, including black mass.	From 1st January 2030, phosphorus must be taken into account in calculating battery material recycling (by Delegated Regulation supplementing 2024/1542). Batteries also contain valuable micronutrients (nickel, copper …), which can be recycled to fertilisers	Batteries contain phosphorus in cathodes (LFP batteries), electrolyte, flame retardants (in electrolyte, cell membranes, casings, wiring, etc).	1 - 250 ktP/y [10]	
Nitrogen salts and solutions recovered from gas-stripping.	From ammonia stripping in anaerobic digesters (methane production from manures, biowastes, …), from industry offgas cleaning (NO_x, N_2O, ammonia removal).	Avoids air pollution (climate gases, National Emission Reduction Commitments Directive) and enables reactive nitrogen recovery for industrial or fertiliser uses (so reducing EU dependency on imported natural gas for Haber Bosch N fixing).	3 200 ktN/y [11]	Offgases are excluded from ABP Regulation. Specify minimum N content (per kg wet weight).

Assumptions, calculations and references

	Stream	*Numbers*	*Source*
(1)	**Sewage sludge incineration ash**	Phosphorus in EU sewage sludge contains c. 300 ktP/y, that is c. 1/5 of total EU phosphorus use	Van Dijk et al. 2016
(2)	**Biomass combustion ash**	10 – 15 million tons of ashes per year for the EU Assuming P ≈ 0.3 – 2.0 % (w/w) and K ≈ 3 – 8 % (w/w), these would contain 30–300 kt P, 300–1200 kt K	https://doi.org/ 10.3390/ma14237164 https://images.chemycal.com/Media/Files/KH0420276ENN.en.pdf https://vric.ucdavis.edu/pdf/fertilization_Woodashes.pdf
(3)	**Municipal solid waste incineration ash**	1-10% K2O content (source A, table 2 and source B table 1) = 0.8 – 8 % K The potassium content can be higher in other streams which can be combined in recovered processes: e.g. in air-pollution control residues, cement kiln dust, chicken litter combustion ash. A European Commission document (EUR-Lex) gives a figure for MSWI bottom ash of c. 25 million tonnes generated annually. CEWEP indicated 19 Mt/y in 2018 Assuming 20 Mt/y of ash and 1 - 5 wt.% K = 200 - 1 000 ktK/y t	*[A]* A review on the utilization of municipal solid waste incineration (MSWI) bottom ash as a mineral resource for construction materials *[B]* Municipal Solid Waste Incineration Ash-Incorporated Concrete: One Step towards Environmental Justice https://www.cewep.eu/bottom-ash-factsheet https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1732108725819&uri=CELEX%3A52021SC0300&utm For P https://pubmed.ncbi.nlm.nih.gov/23490361/ For K https://pure.tudelft.nl/ws/portalfiles/portal/151277448/1_s2.0_S235271022300565X_main.pdf
(4)	**Cat1 MBM**	The EU generates around 1 million t/y of Category 1 Animal By-Product Meat and Bone Meal (MBM). The EU rendering industry EFPRA estimate that Cat1 MBM contains 10 -30 ktP/y in the EU	Martin Alm, EFPRA, in ESPP eNews n°91

(5)	**EU Fertilising Product Component Materials + Materials which are authorised for use as fertilisers in the recipient Member State**	c. 30 **%** of the annual use of inorganic phosphate fertilizers in the EU *could* be substituted by "organic fertilisers derived from domestic secondary raw materials." The total annual need of phosphate fertilisers (P_2O_5) is given as 2,408,000 t P_2O_5 (i.e. the size of the inorganic fertiliser market) 30 % of that gives a substitution potential of about 722 400 t P_2O_5 from recycled sources = 315 000 t elemental P	https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52016SC0064
(6)	**Wastes, wastewaters and sludges from processing of plant materials; from production of human foods or animal feeds, bio-fuels, bio-materials (biochemicals, biofibres); from biorefineries**	Numbers from DG GROW / EU / JRC: - Food waste (EU total, 2023): ≈ 58.2 million tonnes/year (EU Commission reporting) - Estimated P in EU food waste (from FUSIONS / used by ESPP): c. 130,000 t P / year Other data and assumptions: typical elemental P in plant/food biomass / processing residues is 0.1 – 0.5 wt.% depending on material (vegetable peelings and food processing wastes at the higher end; clean straw/wood residues at the low end). For animal-derived processing wastes P% is higher (manure, slaughterhouse residues). See summary table below.	https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20251016-2 https://www.phosphorusplatform.eu/scope-in-print/news?act=dispBoardWrite%27%2F%2F%2F%2F%2F%2F%2F&start=300&utm
(7)	**Aquaculture sludges**	Phosphorus in aquaculture sludge in Norway is estimated 33 ktP/y (PwC for Ragn-Sells) Norway is around 60% total Europe aquaculture.	https://newsroom.ragnsells.com/posts/pressreleases/norwegian-fish-poo-can-power-600000-household?link_id=64cc957d-5ee6-4450-b3d1-2ae70126456f https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Aquaculture_statistics
(8)	**Fire extinguishers and wastes resulting from their refilling**	Approx 1 million t/y EPEP in the EU (extrapolated from 100 000 t/y for UK indicated here). End-of-life extinguishers include other recyclable materials: metals, rubber, plastics. 100 000 t/y of fire extinguisher materials go to waste annually 40% of this is MAP (mono ammonium phosphate), and assuming it is dry: 10800 t P/y	Michelotti, 2017 https://www.phosphorusplatform.eu/images/scope/ScopeNewsletter123.pdf https://www.mdpi.com/2071-1050/16/20/8913#:~:text=The%20type%20of%20spent%20fire,4)2SO4).

(9)	**Phosphorus-containing metal processing liquors and 'spent' phosphoric acids**	There are no public figures. Expert opinion suggests 20 – 45 kt P/y. <u>Other</u> Literature/patents and industry sources report that acid aqueous phosphating (phosphatizing) solutions commonly contain 3 – 50 g PO_4^{3-} / L = 0.98 – 16.3 g P / L . Spent phosphoric acid = concentrated acid no longer usable (contaminated by metals, organics, polymerised material, etc.). 1 ton of pure phosphoric acid (H_3PO_4) contains c. 316 kg elemental P. Commercial acids are sold at various concentrations (e.g. 75% w/w, 54% etc.), so adjust linearly (e.g., 1 t of 75% H_3PO_4 contains 0.75×316 ≈ 237 kg P), but "spent" acid streams from metal treatment or industrial processes may be diluted and contaminated — so the actual P mass per m^3 depends on concentration and dilution.	https://patents.google.com/patent/US6464879B1/en
(10)	**Batteries and battery processing wastes**	P contained in LFP batteries in the EU vehicles: 22,000 – 72,000 tonnes P (total stock in installed batteries) LFP share of EV battery chemistry has been rising; recent market analyses indicate ~30–40% (or ≈40% in some 2024 data) of new EV batteries are LFP (and stationary storage also uses LFP heavily). P processed annually today in EU battery recycling (typical current EU battery recycling capacity ~40 kt battery/yr): 300 – 1,200 tonnes P/year (mostly from LFP fraction of recycled batteries). LFP chemistry ($LiFePO_4$) contains a large share of P in the cathode: ≈ 19.6% P by mass in pure $LiFePO_4$ (chemical composition basis). Published / reviewed estimates translate this into roughly ~25.5 kg P per 60 kWh LFP EV battery pack (this is a commonly cited figure in the literature).	https://www.nature.com/articles/s43246-022-00236-4 https://evmagazine.com/news/idtechex-prominence-lithium-iron-phosphate-ev-batteries https://www.transportenvironment.org/uploads/files/2021_02_Battery_raw_materials_report_final.pdf https://www.nature.com/articles/s43246-022-00236-4

		European BEV (battery-electric vehicle) fleet: ≈ 5.87 million BEVs in 2024 (Eurostat published figure for total BEV fleet). However, total car sales in Europe are around 1 million/year, so if the market goes 100% electric this could lead to 1 million batteries recycled annually (x25 kgP/battery) = 250 ktP/y	https://www.acea.auto/pc-registrations/new-car-registrations-1-9-in-h1-2025-battery-electric-15-6-market-share/
(11)	**Nitrogen salts and solutions recovered from gas-stripping**	N in digestate (Mt): 1.7 (2022), 4.1 (projection 2030), 9.7 (projection 2050). Nitrogen recovery efficiency in ammonia stripping and scrubbing from digestate depends on the process: • Air/steam stripping + acid scrubbing: 70–95 % of ammoniacal N (NH_4^+-N), production of ammonium salts • Vacuum stripping: 60–85 % c. 4.1 Mt of N in digestate in 2030 in EU. 70–90 % N recovery potential through stripping-scrubbing = c 3 200 ktN/y	https://www.europeanbiogas.eu/wp-content/uploads/2024/03/Exploring-digestate-contribution-to-health-soils_EBA-Report.pdf ReNu2Farm, SYSTEMIC, LEX4BIO, and FERTIMANURE projects report 70–90 % N recovery in optimised full-scale stripping units (typically producing ammonium sulfate or ammonium nitrate).

Point (6): Wastes, wastewaters and sludges from processing of plant materials; from production of human foods or animal feeds, bio-fuels, bio-materials (biochemicals, biofibres); from biorefineries

Stream	Published mass (EU)	Published P (if available)	Phosphorus estimate
Food waste (all stages, 2023)	58.2 Mt/yr (Eurostat) European Commission	c. 130,000 t P/yr (FUSIONS / ESPP) nutrient-platform.org	58,200 – 174,600 t P (0.1–0.3% P)
Processing residues (food/feed manufacturing)	no single DG-GROW total	—	5–125 kt P/yr (assumes 5–25 Mt residues × 0.1–0.5% P)
Industrial / processing wastewaters & sludges	no single DG-GROW total	—	1–25 kt P/yr (if 1–5 Mt sludge × 0.1–0.5% P)
Biorefinery residues	case studies only in DG-GROW/JRC	—	1–10 kt P/yr per Mt residues