Recovered material	Input material	Process and market information	Current issue with FPR	Proposed corrections
Nitrogen recovery from liquid phase of wastewaters	Nitrogen is recovered from municipal wastewater (in sewage or sludge treatment) or other wastewaters (e.g. food industry, landfill leachate) by some combination of membrane separation, ion exchange, adsorption - regeneration, the processing to ammonia salts.	EasyMining process: 4 m^3/h pilot operating. In some cases, this functions via a Precipitated Phosphate Salt, in which case covered by CMC12. Cetaqua process under development using commercially available membranes, 1 m^3/h pilot tested, LIFE ENRICH, at ESTE wwtp, Murcia, Spain, producing 45l ammonium nitrate per week. For potential, see Eureau Fact Sheet.	Recovery from offgases from wastewater treatment is covered under CMC15 2(b)iii but NOT recovery from the liquid flows in wastewater treatment. Excluded from CMC11 because wastewater treatment is not a "production process". Excluded from CMC1 because the initial substrate is a waste.	Need to verify heavy metals, organic contaminants, pathogens. Proposal: use the same limits for organic carbon (<0.5%) and for contaminants and pathogens as in CMC15.
Biomass grown in sewage and in other waste waters: i) mechanically processed, ii) chemical extracts.	Algae production can be "fed" with wastes, including nutrients in manure, sewage, digestates, or in biofuel processing discharge, or offgas from cement production (CO_2 or NO_X mitigation); Includes algae, micro-algae, duckweed, other photosynthetic aquatic plants. Can be used either as fertiliser (nutrient content), soil improver (organic carbon) or in biostimulants.	Operational full scale For potential see Eureau Fact Sheet See ESPP – Eureau - EABA letter to DG ENVI and DG GROW of 17th November 2021 at www.phosphorusplatform.eu/regulatory	Both (i) and (ii) may be excluded from CMC1 because waste derived, but this is today not clear. (i) included in CMC2 (plant materials) but only if processing is mechanical only (not e.g. extracts), and if blue-greens not detectable, and if free from foreign materials (plastics, litter, …).	Such waste-fed materials are generally excluded from use as animal feed or in human food, so fertilisers are optimal use. Algae or plants may accumulate certain contaminants from the wastewater in which they are grown.

September 2022
Table of potential future CMC in the Fertilising Product Regulation

Recovered material	Input material	Process and market information	Current issue with FPR	Proposed corrections
Vivianite from sewage	Iron (II) (ferrous) phosphate is precipitated in municipal sewage sludge / digestate, then magnetically separated.	Technology for recovery from municipal sewage digestate is under development: WETSUS ViViMAG 1 m^3/h pilot. Will be upscaled and tested by KEMIRA at 3 sites in Germany, Denmark & The Netherlands in 2022. Vivianite is used as an iron fertiliser to treat Fe-chlorosis, see Diaz 2010, Eynard 1992, Rombola 2003, Rosado 2002, Santiago 2010, 2013. Vivianite recovery has potential for widespread development, because it is applicable to sewage works operating chemical P-removal (dosing iron salts) and this is the most widespread process for sewage works P-removal, with implementation increasing in response to tighter phosphorus discharge limits (EU Water Framework Directive water quality objectives for eutrophication control). WETSUS and KEMIRA estimate that roughly 100-200 kt/y of vivianite (DM) could be produced once the technology is mature and widely applied in EU countries.	Excluded from CMC12 "Precipitated phosphates" by 3(a) iron content.	Purity and contaminants levels are similar to recovered struvite. Proposal to apply the same contaminant limits as CMC12. Could be authorised as an iron fertiliser (micronutrient) but not a phosphate fertiliser, in order to avoid discussions about plant availability of the phosphorus.
Phosphorus leached from sewage sludge, or from pyrolysis products, by acid, solvent CO_2.	Use of acid or solvent or other media to leach phosphorus from sewage sludge, or from biochars / thermal hydrolysis materials from sewage sludge or other organic inputs. The resulting phosphoric acid or P-enriched medium is then used to produce a fertilising product, e.g. by precipitation, extraction or concentration	Acid leaching currently being researched by several companies or institutes. See Tasca in ESPP's SCOPE Newsletter n°141, Shariff in SCOPE Newsletter n°134 Solvent leaching under development by RSR Green Sentinel, see ESPP-DPP-NNP Nutrient Recovery Technology Catalogue. Liquified CO_2 extraction was developed by Budenheim but is currently not under implementation, see Technology Catalogue as above. HTCycle recover phosphorus by precipitation after acid leaching of hydrothermal carbonisation coal from sewage sludge, see ESPP eNews n°52.	CMC12 does not include precipitation from phosphoric acid or other media leached from sewage sludge. CMC12 does include precipitated phosphates from the listed input materials after "thermal hydrolysis up to 275°C" (as well as anaerobic digestion, composting, etc) but does not specify that a leaching stage is possible (precipitation not directly from the thermal hydrolysed sludge, but after acid leaching from the thermal hydrolysis coal). Not covered by CMC13 because not via incineration (not recovery from ash, recovery directly from the sewage sludge). CMC14 does not cover "derivates"	Safety for precipitated phosphates will be "better" than precipitation directly from sewage sludge = CMC12.

About EurEau

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Our members are 35 national associations of water services. At EurEau, we bring national water professionals together to agree European water sector positions regarding the management of water quality, resource efficiency and access to water for Europe's citizens and businesses. The EurEau secretariat is based in Brussels.

With a direct employment of around 476,000 people, the European water sector makes a significant contribution to the European economy.