Interreg North-West Europe Phos4You

Phosphate salts

Origin:	Phosphorus recovery plants at waste water treatment works
Recycling pathways:	• Inorganic fertilizer • Compound solid inorganic macro-nutrient fertiliser • Fertilising product blend

© Veolia

Compound material description

Origin & availability

Precipitated phosphate salts and derivates (P-salts) can be produced at recovery plants using sewage sludge or concentrated industrial water as input material. Based on a precipitation process, the recovery unit can be optimized with a biological or chemical acidification step (e.g. STRUVIA™, PULSE). Application from effluent of small waste water treatment plants (wwtp) are also feasible.

Resources of P-salts range from 110 to 250 tons/year/plant in average, depending on the process implemented, and based on wwtp for 90 000 PE.

P-salts recovery plants can be distributed similarly to wwtps, thus following a decentralized approach. A first full-scale implementation with bioacidification is constructed in Schönebeck (2020).

Quality considerations

P-salts such as struvite are generally grey and turn to white when dehydrating. A minimum of P_2O_5 content of 16% of the dry matter and a max. organic carbon content of 3 % dry matter content ought to be expected. The content of macroscopic impurities, *Salmonella spp*, *E- coli* and *Enterococcace* as well as the further criteria (i.e. as laid down in the STRUBIAS report for P–salts) should be checked.

P-salts with high plant availability of P (e.g. Ca and Mg P-salts) can be used directly as a fertiliser whereas P-salts with a lower plant P-availability (e.g. hydroxyapatite) are suitable as intermediates in a P-fertiliser production process.

The *end-of-waste* status of some P-salts is available in some countries and included in legislation. A REACH registration is required in case the P-salts are to be used as ingredients in EU fertilising products.

Interest & value

Recovered P-salts are a valuable source of phosphorus. As side effect, a sewage sludge with a reduced P-content is generated, which can be used within co-incineration plants such as in the cement industry.

Tips/Be aware

The addition of struvite from sewage to Annex I of Regulation (EC) 889/2008 amending the EU-Eco-Regulation (EC) 834/2007 is under consideration.

Various business models are existing depending on the interaction of the technology provider with the fertiliser market.

Recycling pathways

As this material can be recycled as a fertiliser, the proposed formulations refer to a possible Product Function Category (PFC) acc. to the numbering set up in the EU Fertilising Products Regulation ((EU) 2019/1009). The recognition of *precipitated phosphate salts and derivates* as compound material category (CMC) is in process. If the CE mark is not applied for, existing national legislations (and possibly Reg. (EU) 2019/515 on mutual recognition) apply.

Authors: C. Mébarki [1], B. Oudouh [2], M-E. Ploteau [3] / [1] Veolia Environnement, [2] SEDE Environnement, [3] Lippeverband / cedric.mebarki@veolia.com, ploteau.marie-edith@eglv.de

Inorganic macronutrient fertiliser – PFC 1(C)(I)

P-salts can be incorporated such as P extracted from P-Rock into granulated water-soluble straight P fertilisers or compounds fertilisers (NPK, NP, incl. Mg).

The targeted users are a.o. the existing fertiliser industries with international market outreach.

A limiting factor is surely the constant and homogenous supply of a minimum quantity (approx. 10 000 tons P-salts/year). Also clear agreement should be made for the case the P-salts don´t reached the wished quality.

The reliability of a continuous wwtp operation can incite fertiliser companies to use P-salts as input material.

Compound solid inorganic macronutrient fertiliser – PFC 1(C)(I)(A)(II)

Providing appropriated granulometry, the P-salts are directly usable as compound solid inorganic macronutrient fertiliser (e.g. N-P-Mg) for land application or gardening.

Direct users, such as farmers or landscaping enterprises belong to the target group. Producer of eco-friendly compounds for gardening and horticulture are also targeted to make the products available for hobby gardeners.

Offer and demand might be regulated through storage capacities.

The enabled short chain supply is a main factor in support of this use. For farmers, the application is independent of land registry (contrary to sludge spreading). Hobby gardening is an expanding market that can also foster the reuse of recovered P-salts.

Fertilising product blend – PFC 7

P-salts (as inorganics fertilisers) can be mixed with products of other PFC to offer a customized balance by adjusting fertilising inputs to crop requirements.

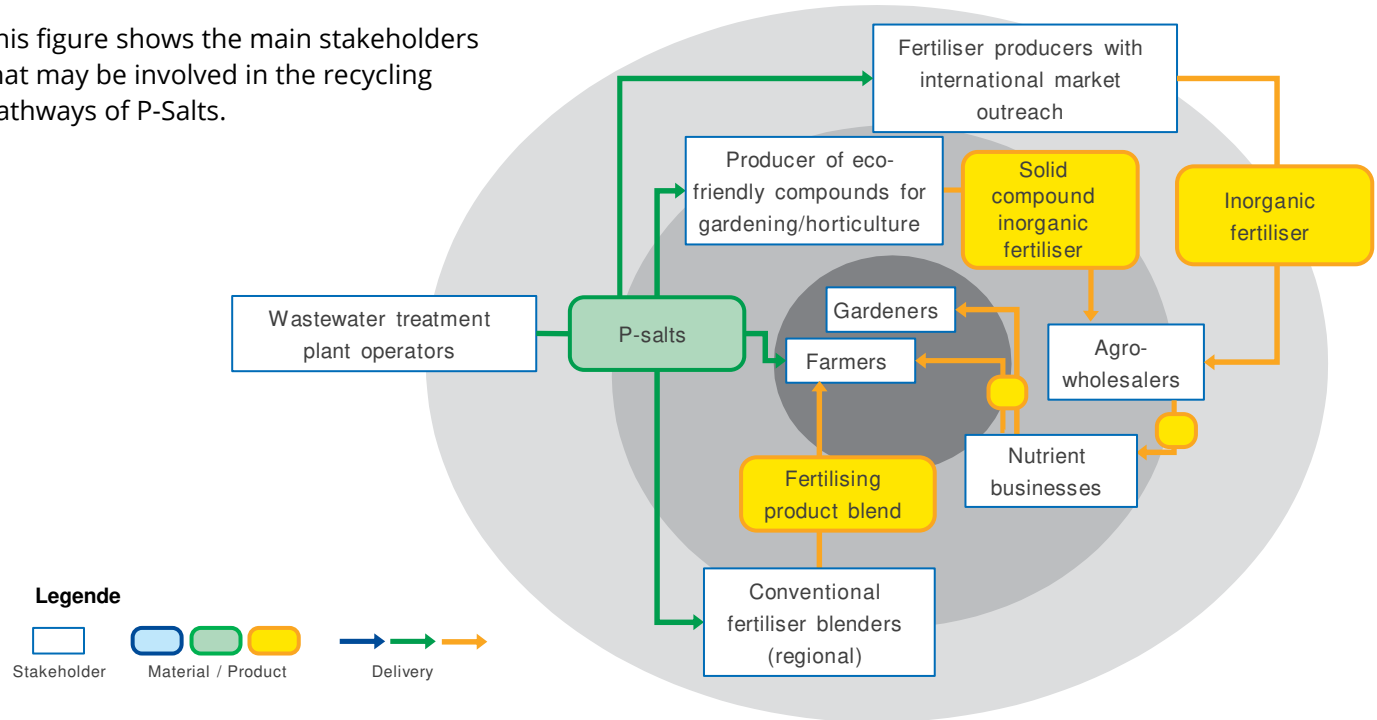
The targeted users are the fertilisers blenders.

The match between demand and offer can be faced providing storage capacities of P-salts are available.

The increase of the demand of customized fertiliser is a supporting factor for this route.

Stakeholders mapping

This figure shows the main stakeholders that may be involved in the recycling pathways of P-Salts.



Authors: C. Mébarki [1], B. Oudouh [2], M-E. Ploteau [3] / [1] Veolia Environnement, [2] SEDE Environnement, [3] Lippeverband / cedric.mebarki@veolia.com, ploteau.marie-edith@eglv.de