



# European Sustainable Phosphorus Platform

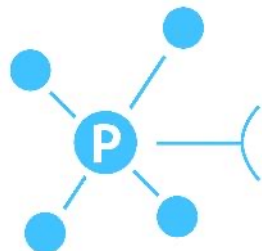
**European Parliament – EUCHEMS science-policy workshop on phosphorus**

***Robert Van Spingelen, European Sustainable Phosphorus Platform***

**[www.phosphorusplatform.eu](http://www.phosphorusplatform.eu)**

# European Sustainable Phosphorus Platform (ESPP)





## European Sustainable Phosphorus Platform

Legal entity,

→ **transparency**

→ **clear decision making**

→ **representation**

- established 2014

- Belgian not-for-profit association

- statutes are public

- EU Transparency Register no. 260483415852-40

100% membership funded

→ **credibility, independence**

50+ paying members :

Industries, SMEs,

R&D institutes & projects,

cities & regions

→ **Balances the interests of society & industry from the perspective of nutrient conservation**

SCOPE NEWSLETTER

December 2020 n° 139 - page 2



### What they said ...

 ILVO	Reduction in fertiliser P use is certainly possible, but it will require decades to reduce soil P and, therefore, P losses. <i>Fien Amery, ILVO Flanders</i>
 WAGENINGEN UNIVERSITY & RESEARCH	The 50% nitrogen loss reduction target by the green deal is on average required in the EU to protect air and water quality but it varies strongly with location. <i>Wim de Vries, Wageningen University &amp; Research</i>
 EurEau	The waste water sector is already removing nutrients and supporting reuse of nutrients. We want to extend this in order to contribute to sustainable nutrient management and the Circular Economy. <i>Sarah Gillman, EurEau</i>
	DG R&I is working on new, systemic approaches to combat nutrient pollution from all sources and bring nitrogen and phosphorus flows back within Planetary Boundaries. <i>Katja Klasing, European Commission DG Research &amp; Innovation</i>
 UK Centre for Ecology & Hydrology	It is great to see the Colombo Declaration goal embraced by the EU Farm to Fork Strategy. 'Halving Nitrogen Waste' from all sources will help meet multiple SDGs, saving billions of Euro in fresh nitrogen inputs. <i>Mark Sutton, UKCEH &amp; INMS</i>
	In line with the zero pollution ambition of the EU Green Deal, the Commission will propose an integrated nutrient management action plan to address nutrient pollution at source and a better management of N and P throughout their lifecycle. <i>Andrea Vettori, European Commission DG Environment</i>
 LEIBNIZ SCIENCE CAMPUS PHOSPHORUS RESEARCH ROSTOCK	European policies, such as the CAP, need to be clearly aligned with the targets of the Farm-to-Fork strategy. Major pollutants, particularly intensive livestock farming, have to be addressed. <i>Jessica Stubbendorf, University of Rostock</i>
	Nature and the health of ecosystems on which all life depends are under threat. One major reason is agricultural pollution. We must take transformative action to address this crisis. <i>James Byrne, Wildlife Trusts Wales</i>
 Environment Agency	The workshop provided an excellent overview of the latest policy and science, and showed how the nutrient 'community' must work together to achieve extremely ambitious goals. <i>Rachel Dils, Environment Agency (England)</i>
 fertilizers europe	We accept the F2F ambition to reduce nutrient losses by 50%. Supporting farmers with innovative solutions is a precondition. Nevertheless, 2030 seems unrealistic for this huge challenge and requires a full impact assessment. <i>Tiffanie Stephani, Fertilizers Europe</i>
 MTK	Finnish agriculture has already decreased P use by -70% and N use -30%. MTK considers that Farm-to-Fork targets should not fix the same nutrient reduction percentages for all Member States. <i>Liisa Pietela, Finland Farmers and forests organisation</i>
	Nitrogen and phosphorus boundaries are all too often forgotten as a major environmental

Robert Van Sprongeren, ESF P, EUCHEMS workshop 23 May 2023

ainable  
atform



# ESPP in action

- **Decision by consensus**
- **Mediation rather than advocacy**
  - enable dialogue between stakeholders
  - develop shared policy proposals
  - communicate with regulators
- **Communication tools:**
  - web site [www.phosphorusplatform.eu](http://www.phosphorusplatform.eu)
  -  [LinkedIn](#) (800 followers)
  -  [Twitter](#) (2500 followers)
  - eNews, Scope Newsletter, 100 000 + emailing list (11 – 14% identified opening rate)



ESPP eNews n°72 January 2023

## Policy

### European Commission Communication on availability and affordability of fertilisers

The Commission recognises the EU's dependency on imports for fertilisers, impacting farmers' costs and food insecurity, and the strategic need for organic fertilisers, green ammonia and nutrient recycling, alongside sustainable and precision farming, to improve nutrient use efficiency and reduce losses.

Actions announced include:

- Use CAP (Common Agriculture Policy) Member State Strategic Plans to support efficient and sustainable fertiliser use whilst preventing nutrient losses, including rollout of the FaST tool (Farm Sustainability Tool for Nutrients): "CAP Strategic Plans support partial replacements of mineral fertilisers by organic fertilisers like manure, sewage sludge and biowaste, from methanisation processes or biological and thermal treatments, while ensuring that this does not result in higher nutrient losses"
- Organic and recycled fertilisers: "Better access to organic fertilisers and nutrients from recycled waste-streams, especially in regions with a low usage of organic fertilisers"
- Support for Green Ammonia (from renewable energies, not from natural gas)

## Phosphate in diet and health

### Trends in US dietary P intake

Analysis of data 1988 – 2016 suggests that US average adult phosphorus intake rose by around 8% to c. 1.4 gP/person/day whereas intake of food additive phosphorus fell. The study uses US official survey estimates of intakes of different types of food and tables of P-content for each food type (both from NHANES US National Health and Nutrition Survey and WWEIA What We Eat in America, sampling around 5 000 persons annually), combined with industry-sourced information on levels of food additive P commercially used in each food type and market survey (Innova Market Insights) data on the % of each food type sold containing or not food P additives. Estimated mean P intake increased from 1.29 gP/person/day in 1988-1994 to 1.43 in 2011-2012, then fell again to 1.4 gP/person/day in 2015-2016, that is +8% from 1988 to 2016. Food additive P consumption peaked in 2011-2012 and fell to its lowest level of the period in 2015-2016, at c. 9% lower than in 1988-1994. When compared to mean body weight, which has increased in the US over the period, total P intake again peaked in 2011-2012 but was slightly lower in 2015-2016 than in 1988-1994. This is relevant in that dietary recommendations for P intake are generally expressed per kg body mass. The highest sources of dietary P are identified as cheese, pizza, chicken meat, milk and eggs, but in total these make up <20% of total P intake, however the paper eludes the point raised by other authors that food additive P is generally highly soluble and so is taken into the body whereas only c. 60% of natural diet P is adsorbed (Noori

Robert Van Spingelen, ESPP, EUCHEMS workshop 25 May

# ESPP in action

## **EU regulatory and policy dossiers**

1. Fertiliser supply and food security
2. Green Deal
3. Integrated Nutrient Management Action Plan
4. EU Green Finance 'Taxonomy'
5. Nitrogen recovery & recycling
6. EU Critical Raw Materials Act
7. EU Fertilising Products Regulation
8. Soil Health Directive
9. CAP
10. Recycled nutrients in Organic Farming
11. BAT (Industrial Emissions Directive)
12. Recycled nutrients in Organic Farming
13. Sewage Sludge Directive
14. Urban Wastewater Treatment Directive
15. Animal Feed Regulation
16. R&D – Horizon Europe – LIFE - Interreg

## **National policies**

- Germany 2017, Switzerland 2015
- Austria proposed sewage P-recovery obligation
- Baltic Nutrient Recycling Strategy (HELCOM)

*Expected Spring 2023*

*Proposals 5/4/2023*

*Regulatory proposal 20/3/2023  
Phosphorus NOT on proposed sub-list  
of "Strategic" materials*

*Recovered precipitated phosphates  
17/1/2023*

*Regulatory proposal  
26/10/22*

**YOUR EUROPE**

**YOUR SAY !**

European Sustainable  
Phosphorus Platform



# Some ESPP 2022 achievements

- Legal obligation to recover P from sewage notified by Austria  
→ 3<sup>rd</sup> European country, after Switzerland, Germany [www.phosphorusplatform.eu/eNews070](http://www.phosphorusplatform.eu/eNews070)
- Regulatory proposal for Urban Wastewater Treatment Directive  
→ includes framework to set minimum reuse & recycling rates for N and P
- EU Fertilising Products Regulation entered into force July 2022  
→ composts, digestates, recovered phosphates, ashes, biochars
- Recovered precipitated phosphates in Organic Farming → published [17/1/2023](http://17/1/2023)
- 4<sup>th</sup> European Sustainable Phosphorus Conference  
→ Engagement with Vienna City, > 300 participants  
[www.phosphorusplatform.eu/Scope143](http://www.phosphorusplatform.eu/Scope143)
- Nitrogen recovery: launch of N-recovery working group, 2023  
Technology and research progress  
[www.phosphorusplatform.eu/NRecovery](http://www.phosphorusplatform.eu/NRecovery)




7<sup>th</sup>  
June  
2023  
Brussels  
& hybrid





# Nutrient recovery technology catalogue

<http://www.phosphorusplatform.eu/techcatalogue>

Process & contact	Input materials	Output products	Process description	Operating status	Photos
<b>Sewage P-recovery: full scale plants operating or under permitting/construction</b>					
<b>Fertiliser industry – E.g., ICL, Borealis ...</b> <b>Members of ESPP / DPP / NNP</b> <a href="http://icl-group-sustainability.com/reports/producing-fertilizers-with-recycled-phosphate/">http://icl-group-sustainability.com/reports/producing-fertilizers-with-recycled-phosphate/</a> Contact (ICL): <a href="mailto:anthony.zanelli@icl-group.com">anthony.zanelli@icl-group.com</a> Contact Borealis: <a href="mailto:wolfgang.hofmair@borealisgroup.com">wolfgang.hofmair@borealisgroup.com</a>	Input: sewage sludge incineration ash, from sewage works using biological and/or chemical P-removal; animal by-product ash (Cat 2, 3); recovered phosphate salts.	Standards mineral fertilisers.  Fertiliser production plant must have operating permit authorising to process waste.	Recovered materials are mixed into the phosphate rock or phosphoric acid based fertiliser production process, either during acid attack of rock, or after this stage where product still has residual acidity (acidulation), so ensuring plant availability of P in ashes.  Contaminants in ash are diluted in final product. This is legal under EU regulation on condition that the ash is not classified as “Hazardous”. Final fertiliser product is covered by EU Fertilising Products Regulation ‘STRUBIAS’ annexes as proposed.  Recovery rate (P in final product / P in input ash): c. 100%  Iron and aluminium in input ash are transferred into final product  Heavy metals are not removed.	ICL tested full scale and industrial installations now operation at ICL Netherlands (inaugurated March 2019, photo) and Germany (several hundred tonnes ash and struvite processed to date). Production from 100% ashes (without mixing with phosphate rock) is planned.  Borealis  Use of ash in fertiliser production has also been tested at Fertiberia Spain (MBM ash at lab scale)	
<b>Ash2Phos (EasyMining)</b> <b>Member ESPP, DPP</b> <a href="http://easymining.se/">http://easymining.se/</a> Contact: <a href="mailto:Jan.svard@ragnsells.com">Jan.svard@ragnsells.com</a>	Input: sewage sludge incineration ash, from sewage works using biological and/or chemical P-removal.	Calcium phosphate; can be converted into – superphosphate (SSP), - di-calcium phosphate (DCP), - mono-ammonium phosphate (MAP).  Product can be used as feed phosphates (subject to legal provisions): shown to be effective as a feed phosphate, soluble in citric acid and digestible for pigs and poultry.  Product can also be used as raw material for NPK fertilizers.  Ferric chloride as a coagulant for wastewater treatment	Sewage sludge ash is dissolved in hydrochloric acid (40°C, no pressure).  The residue of ash which is not dissolved in acid consists mainly of inorganic silicates, and after separation and washing can be used in the cement or concrete industries ( <a href="#">Ottosen et al., 2021</a> ).  Phosphorus, iron and aluminium compounds are separated from the acid leachate and from each other by specific dissolution and precipitation reactions, in processes characterised by internal recirculation of chemicals.  The remaining acid solution is neutralized and treated to remove heavy metals.  Most heavy metals end up in a concentrated heavy metal cake (c. 30 kg DM cake per tonne ash input) that can be landfilled or used for further extraction of metals.  <b>Recovery rate (P in final product / P in input ash): &gt;85%</b>	Pilots in Sweden: Uppsala, 50 kg ash/day ash and Helsingborg, 600 kg/day ash.  Full scale plants: - 30 000 t/y ash, Helsingborg, Sweden (permit application submitted), with Kemira - 30 000 t/y ash planned, Schkopau, (permit application ongoing)	 



# Nutrient platforms - partners of ESPP

- **Netherlands 2010** <http://www.nutrientplatform.org/>
- **Germany 2015** [www.deutsche-phosphor-plattform.de](http://www.deutsche-phosphor-plattform.de)
- **North America Sustainable Phosphorus Alliance (SPA) 2017**  
(launched as NAPPS in 2015) <https://phosphorusalliance.org/>
- **Japan PIDO 2011** (Phosphorus Industry Development Organization of Japan) [www.pido.or.jp](http://www.pido.or.jp)
- **Global Partnership for Nutrient Management (UNEP)**  
<http://www.unep.org/gpa/what-we-do/global-partnership-nutrient-management>
- **Nutrient platform projects: Ireland, Italy, Sweden, ...**



**Sustainable  
Phosphorus  
Alliance**



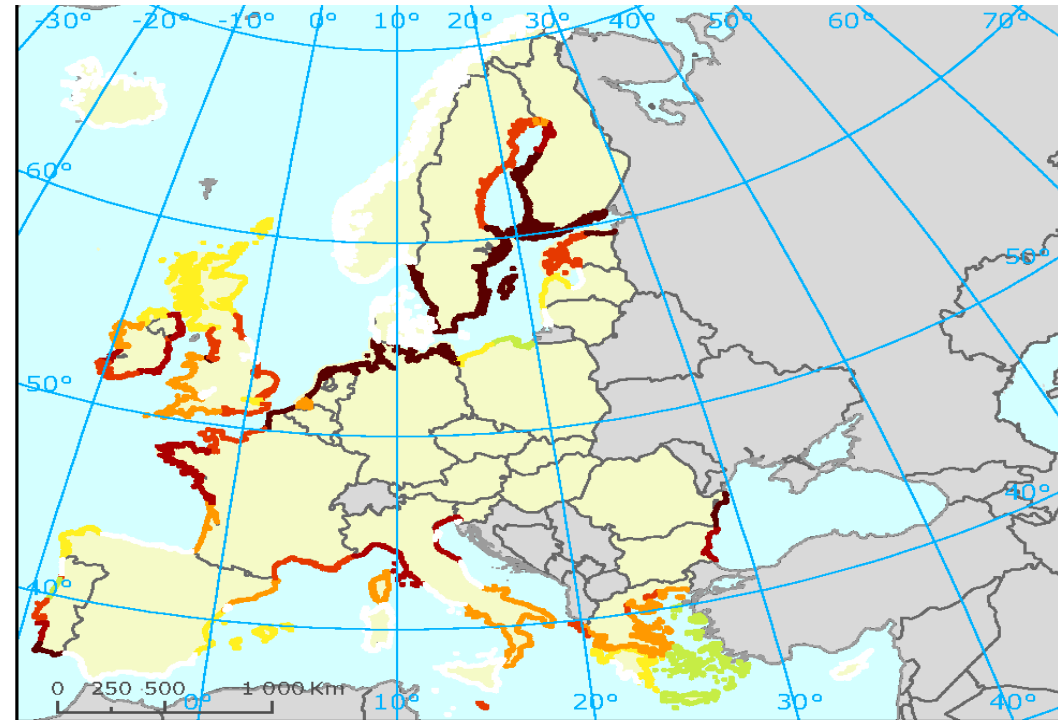
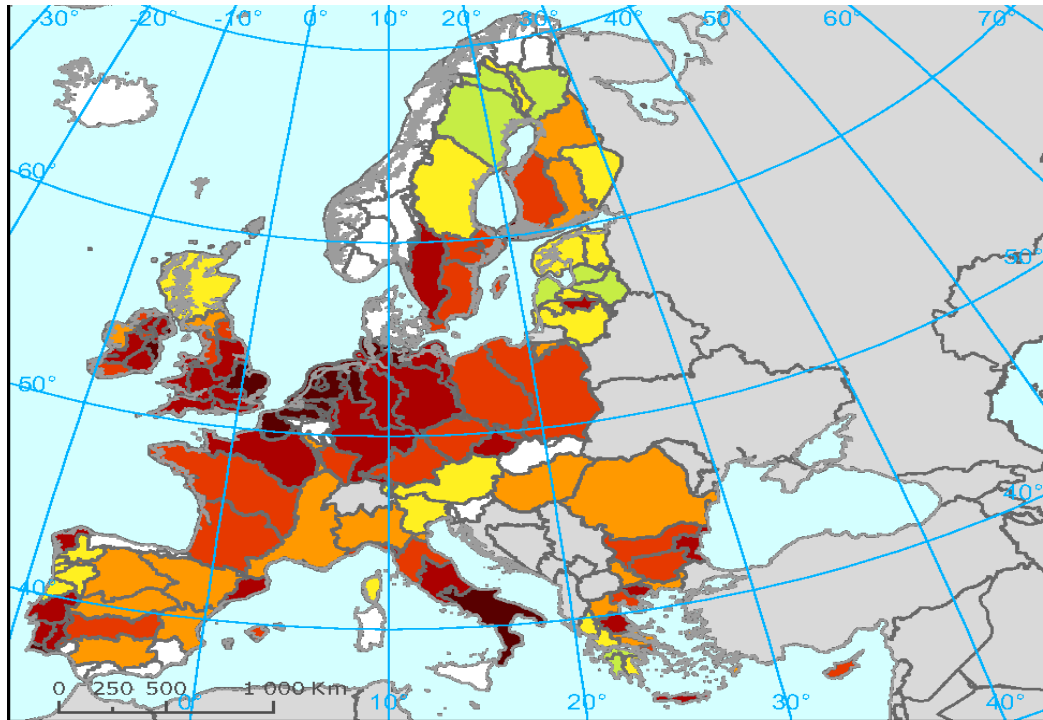


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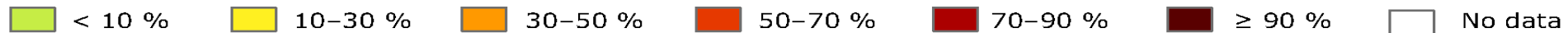
## EU (Nutrient) Policy Framework



# Eutrophication



Percent of classified water bodies affected by point and/or diffuse pressures





**And yet .....**

**Without  
mineral phosphate fertilisers  
we could feed maybe **1/5<sup>th</sup>**  
of the current world population**

Adapted from Dawson et al., Food Policy 2011:  
<http://www.sciencedirect.com/science/journal/03069192>

**Without Haber-Bosch  
(mineral nitrogen fertilisers)  
we could feed **only half**  
of the current world population**

- Fertilizers Europe / Wageningen University
- SMIL 2004 <https://mitpress.mit.edu/books/enriching-earth> and discussion here <https://ourworldindata.org/how-many-people-does-synthetic-fertilizer-feed>
- Erisman 2008 <http://dx.doi.org/10.1038/ngeo325>



# *Phosphorus recycling: a long tradition*





# European Green Deal <sup>1</sup>

- Farm-to-Fork Strategy <sup>2</sup>
- Biodiversity Strategy <sup>3</sup>
- Chemicals Strategy <sup>4</sup>
- Zero Pollution Action Plan <sup>5</sup>
- Circular Economy Action Plan <sup>6</sup>

Green Deal states possible  
“legal requirements to boost the market  
for secondary raw materials, with  
mandatory recycled content”



1 = COM(2019)640 [https://ec.europa.eu/info/files/communication-european-green-deal\\_en](https://ec.europa.eu/info/files/communication-european-green-deal_en)

2 = COM(2020)381, 20th May 2020 <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590404602495&uri=CELEX%3A52020DC0381>

3 = COM(2020) 380 final, 20th May 2020 [https://ec.europa.eu/environment/nature/biodiversity/strategy/index\\_en.htm](https://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm)

4 = COM(2020)667, 14/10/2020 <https://ec.europa.eu/environment/pdf/chemicals/2020/10/Strategy.pdf>

5 = <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12588-EU-Action-Plan-Towards-a-Zero-Pollution-Ambition-for-air-water-and-soil/public-consultation>

6 = 11/3/2020 <https://ec.europa.eu/environment/circular-economy/>



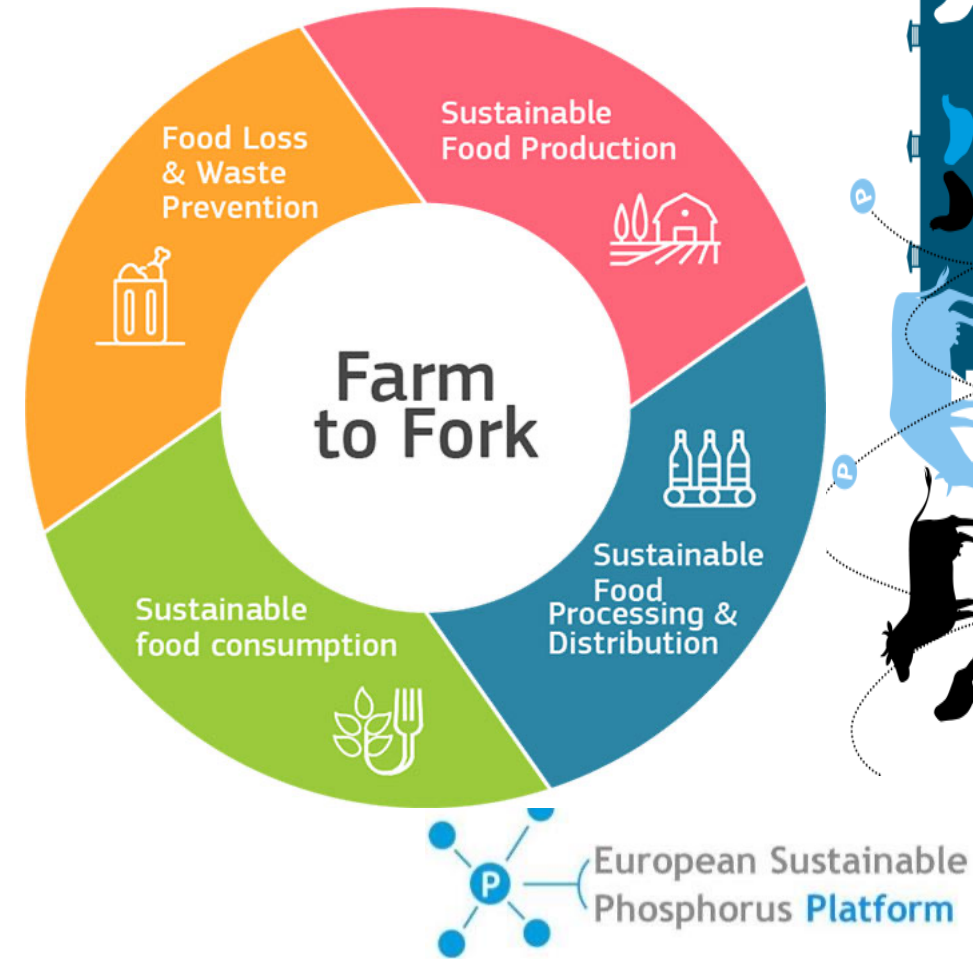


# Farm-to-Fork Strategy Com(2020) 381

## and Biodiversity Strategy COM(2020) 380

Target to reduce nutrient losses by at least -50%, without deteriorating soil fertility, resulting in a reduction in fertiliser use of at least -20%.

Circular, bio-based economy focusing on nutrient recovery & recycling





## National P Recycling Regulations



# European States with P-recycling Obligation

## Switzerland

- 2016 VVEA (waste act), Art 15, makes **phosphorus recycling becomes obligatory by 2026** from sewage sludge incineration ash\* and meat and bone meal ash  
\* Switzerland banned land use of sewage biosolids in 2006



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra



Bundesministerium  
für Umwelt, Naturschutz  
und nukleare Sicherheit

National | Verordnungen | AbfKlärV

Verordnung zur Neuordnung der Klärschlammverwertung  
Klärschlammverordnung



Bundesministerium  
Klimaschutz, Umwelt,  
Energie, Mobilität,  
Innovation und Technologie

## Germany

- AbfKlärV 2017 (sewage sludge regulation): **phosphorus recycling from sewage becomes obligatory**  
- by 2029 / 2032 years for all WWTPs > 100 000 P.E. / 50 000 P.E.  
if sewage sludge P > 2% of dry matter

## Austria (draft notified)

- 2022 AVV Abfallverbrennungsverordnung 2022 **phosphorus recycling becomes obligatory by 2030**  
for WWTP >20 000 P.E. from sewage sludge (>60% recovery) or sludge ash (>80% recovery)

Under consideration in other countries (e.g., Denmark) and EU (New Sewage Sludge Directive 2023?)

<https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12328-Evaluation-of-the-Sewage-Sludge-Directive-86-278-EEC/-public-consultation>



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# European Sustainable Phosphorus Platform

Dossiers underway



# EU “Taxonomy”: criteria for sustainable finance

## Draft regulation

*Consultation to 17<sup>th</sup> June 2023*

[https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13237-Sustainable-investment-EU-environmental-taxonomy\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13237-Sustainable-investment-EU-environmental-taxonomy_en)

Proposal includes phosphorus recovery from sewage

ESPP requests:

- Include nitrogen recovery
- Include recovery from other waste streams
- Clarify wording to not exclude routes/technologies

and

- Add nutrient recycling to criteria for biogas and composting



# Urban Waste Water Treatment Directive recast

## Currently in European Parliament + Council

*Dossier 2022/0345(COD)*

- Tighter P discharges
  - 0.5 mgP<sub>total</sub>/l or 90% P removal (was 1-2 mg/l or 80%)
  - 6 mgN/l or 85%N removal (was 10-15 mg/l or 70-80%)
- **Proposed Art. 20:**  
**Delegates COM to fix Phosphorus and Nitrogen reuse and recycling targets**  
*- ESPP proposes modified wording to not exclude some routes/processes*
- Monitoring of greenhouse gas emissions and “energy neutrality” (N<sub>2</sub>O ?)
- Extended Producer Responsibility (pharmaceuticals, cosmetics) and ‘Quaternary treatment’
- Smaller sewage works, water reuse, microplastics monitoring ...





# Critical Raw Materials Act

**Currently in public consultation**

COM(2023)160

**to 30<sup>th</sup> June**

**then European Parliament + Council**

**“Phosphate Rock” and “Phosphorus” (i.e. elemental  $P_4$  and derivatives)**

- Maintained on list of Critical Raw Materials
- **But NOT on sub-list of “Strategic Raw materials”**

[https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13597-European-Critical-Raw-Materials-Act\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13597-European-Critical-Raw-Materials-Act_en)



# Critical Raw Materials Act

## Why “Phosphorus” should be a **STRATEGIC** Raw material

*(“Phosphorus” means elemental  $P_4$  = White Phosphorus, and derivatives)*

*‘Strategic’ Raw materials are those identified as supply-critical and needed for ‘strategic’ industry sectors: batteries, renewable energy, electronics & data, aerospace*

- **$P_4$  / derivatives are essential for:**  
*(not feasible to replace with other chemicals, nor with phosphoric acid)*
  - microchip etching, semiconductor doping
  - batteries: electrolyte of lithium ion batteries ( $LiPF_6$ )
  - fire safety: non-halogenated flame retardants for plastics, compounds, textiles ...
  - hydraulic fluids and lubricants

- **EU is 100% import supply dependent** on Vietnam, China, Kazakhstan



# Critical Raw Materials Act

**Why “Phosphate Rock”  
or “Purified phosphoric acid”  
should be a STRATEGIC Raw material**

- **Purified Phosphoric Acid is essential for:**
  - LFP Lithium Iron Phosphate batteries ( $\text{LiFePO}_4$  cathodes)
  - phosphoric acid fuel cells
  - steel anti-corrosion
  - fire safety for wood, fibres, ...
- **30 – 50 % increase in global acid purification capacity is needed to supply LFP battery production alone**





# Critical Raw Materials Act

**Food security  
should be also considered STRATEGIC**

ESPP proposes:

“The Commission shall assess and if appropriate propose an update of Annex I to add to the list of strategic raw materials, a list of raw materials and agricultural input supply chains identified as of the highest importance for EU food security ...”



# Upcoming events

<https://www.phosphorusplatform.eu/events>

**7th  
June  
2023**  
**Brussels  
& hybrid**



**White  
Ammonia  
Research  
Meeting**

[www.phosphorusplatform.eu/nrecovery](http://www.phosphorusplatform.eu/nrecovery)





# European Sustainable Phosphorus Platform

[www.phosphorusplatform.eu](http://www.phosphorusplatform.eu)

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