ENEA

Workshop

Il fosforo come materia prima critica: PROSPETTIVE TECNOLOGICHE, NORMATIVE E DI MERCATO

PIATTAFORMA ITALIANA DEL FOSFORO

Politecnico di Milano

CAMPUS LEONARDO
Aula Rogers

Piazza Leonardo Da Vinci, 32
20133 Milano

16 17 OTT 2024

in collaborazione con:

POLITECNICO MILANO 1863

European Sustainable Phosphorus Platform

Veronica Santoro

16-17 Ottobre 2024

Workshop *“Il fosforo come materia prima critica: prospettive tecnologiche, normative e di mercato”* - Piattaforma Italiana Fosforo

What is ESPP

ESPP is a neutral, **non-profit organisation**, established in 2014 and funded by its members, which brings together industry, knowledge institutes and public establishments, alongside national nutrient platforms, to **promote and implement phosphorus sustainability and nutrient recycling in Europe**.

Transparency
Clear decision making
Representation

Payment = commitment, credibility, independence, in touch with reality

Decision by consensus
Mediation and not advocacy

ESPP Statutes

Members

ESPP balances the interests of society & industry from the perspective of nutrient conservation

ESPP in action

NETWORKING AND CONTACTS

ACCESS to expertise, experience, competence

DIALOGUE with policy makers, technical organisations, stakeholders

COMMUNICATION of proposals for collaboration and calls

SHOWCASE of Members' actions, project results, success stories and innovations

EXCHANGE with national Nutrient Platforms and projects, international organisations

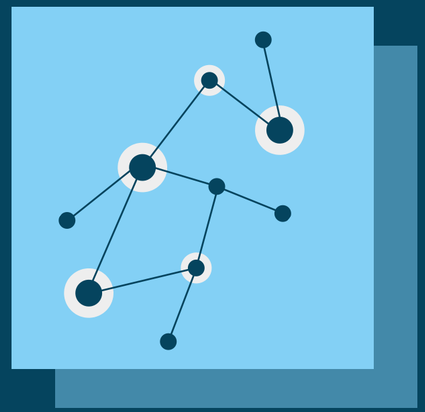
ESPP collaborations

Industry associations

EurEau, Cefic, Eurofema,
Ecofi, FEFAC, EFPRA, EBC

International organisations

NGOs, UNEP,
OECD, FAO



Networks

ECN, EBA,
RaceForTheBaltics

Farmers, NGOs

COPA-COGECA,
iFOAM, EEB

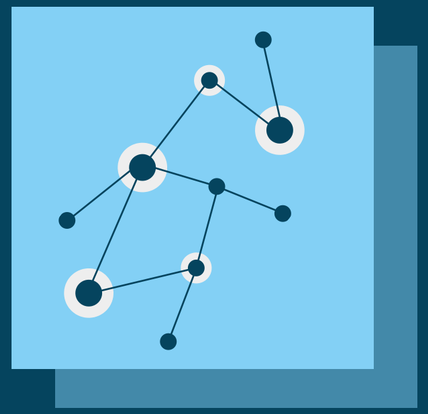
ESPP collaborations

Industry associations

EurEau, Cefic, Eurofema,
Ecofi, FEFAC, EFPRA, EBC

International organisations

NGOs, UNEP,
OECD, FAO



Networks

ECN, EBA,
RaceForTheBaltics

Farmers, NGOs

COPA-COGECA,
iFOAM, EEB

National and regional Nutrient Platforms

National and regional platforms

- Germany
- Italy
- Netherlands
- Ireland
- Switzerland
- V4 (Czech Republic, Hungary, Poland and Slovakia)
- Sweden

Nutrient platforms

National and regional platforms

- **Germany**
- **Italy**
- **Netherlands**
- **Ireland**
- **Switzerland**
- **V4 (Czech Republic, Hungary, Poland and Slovakia)**
- **Sweden**

International platforms:

- **North America** Sustainable Phosphorus Alliance
- **UNEP (GPNM)**
  United Nations Environment Programme

[Nutrient platforms]

AWARENESS AND COMMUNICATIONS

WEBSITE

www.phosphorusplatform.eu

NEWSLETTER

SCOPE and eNews

110.000+ emailing list

SOCIAL MEDIA

LinkedIn

2.150 followers

X 2.600 followers

ESPP EU nutrient research & development projects list

EU H2020 (FP), LIFE, INTERREG and national/industry funded R&D projects on nutrient recycling and management

Date: 15-06-2021

European Sustainable Phosphorus Platform (ESPP)
info@phosphorusplatform.eu - Chris Thornton, Secretary General
www.phosphorusplatform.eu

Please provide your inputs for this database by writing to
veronica.santoro@phosphorusplatform.eu

Table of Contents

P-RELATED R&D PROJECTS INVENTORY

www.phosphorusplatform.eu/R&D

NUTRIENT RECOVERY TECHNOLOGY CATALOGUE

http://www.phosphorusplatform.eu/techcatalogue

ESPP – DPP – NNP nutrient recovery technology catalogue http://www.phosphorusplatform.eu/techcatalogue

Disclaimer:
This document aims to provide an indicative overview, not technical information to support decision making. It is accurate to the best of our knowledge, but further information and updates should be sought from the indicated contacts. The information included has been discussed between ESPP and the technology suppliers, and in general validated by these companies. However, ESPP, DPP and NNP do not have resources necessary to audit information provided and information is included as provided by the companies. Inclusion in this document does not constitute any endorsement of technology(ies) by the nutrient platforms, nor validation of intellectual property nor commercial claims.

EU POLICY AND REGULATORY DOSSIERS

Key 2024-2025 dossiers

Critical Raw Materials Act	See below
EU Fertilising Products Regulation	Opens European market for recycled fertilisers and recycling technologies. Manure in compost, digestate, ashes now included (conditions). Cat2-3 ABPs still pending (Aug 2023)
EU Green Finance 'Taxonomy'	Reg. 2023/2486. Includes **P recovery from municipal wastewater** (15% of WWTP P input or 80% of P from sludge ash)
Recycled nutrients in Organic Farming	**Struvite & phosphate salts from sewage** authorised (Jan 2023) Positive EGTOP Opinions on Calcined phosphates (2016) and Calcium phosphate (May 2024) both from sewage only
Soil Health Directive	Proposed new Directive (Jul 2023), currently in Parliament and Council Proposed **maximum soil Olsen P levels (30-50 mg/kg)**
Urban Wastewater Treatment Directive Recast	2022/0345(COD) (Pending legal publication). **Tighter P and N discharge constraints** + art 20: "The Commission is empowered to adopt delegated acts … specifying a **combined minimum reuse and recycling rate for phosphorus from sludge and from urban wastewater** not reused"
Sewage Sludge Directive	Evaluation support study (Dec 2023)
Circular Economy Act	Announced for 2025, aiming at creating **market demand for secondary material**, single market for waste, especially for CRMs (Ursula von der Leyen COM presidency candidacy document)

YOUR EUROPE YOUR SAY !

NATIONAL POLICIES

European States with P-recycling obligations

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*
Germany	AbfKlärV 2017 (sewage sludge regulation): **phosphorus recycling from sewage becomes obligatory** by 2029/2032 for all WWTPs > 100 000 P.E./50 000 P.E. if sewage sludge P > 2% of dry matter
Austria	AVV Abfallverbrennungsverordnung 2024 **phosphorus recycling becomes obligatory by 2030** for WWTP >20 000 P.E. from sewage (>60% recovery of WWTP inflow) or sludge ash (>80% recovery)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

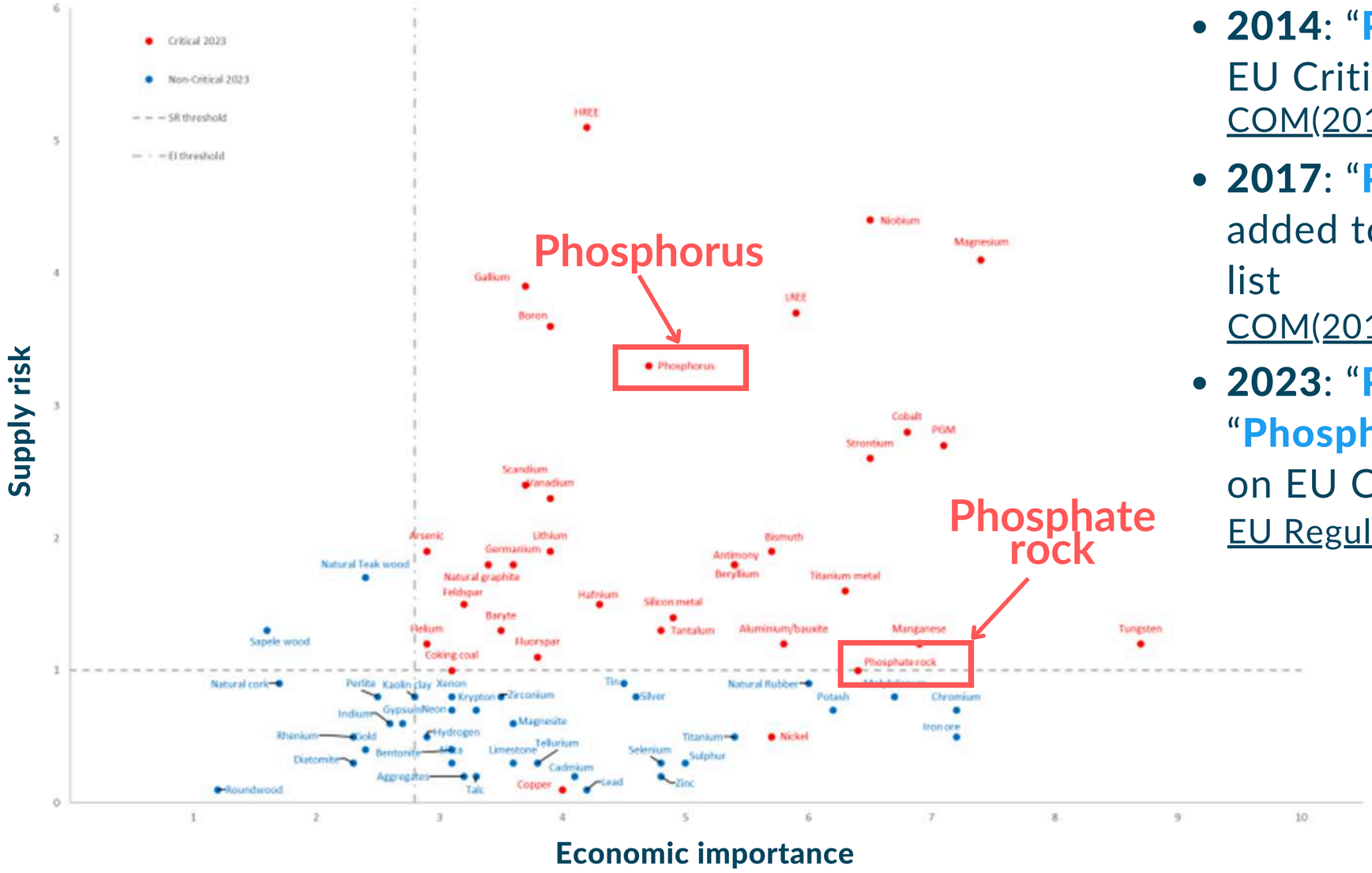
Bundesministerium
für Umwelt, Naturschutz
und nukleare Sicherheit

National | Verordnungen | AbfKlärV
Verordnung zur Neuordnung der Klärschlammverwertung
Klärschlammverordnung

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

www.phosphorusplatform.eu/regulatory

Critical Raw Materials Act



- **2014**: "**Phosphate Rock**" added to EU Critical Raw Materials list COM(2014)297
- **2017**: "**Phosphorus**" (meaning P_4) added to EU Critical Raw Materials list COM(2017)490
- **2023**: "**Phosphate Rock**" "**Phosphorus**" (meaning P_4) remain on EU Critical Raw Materials list EU Regulation 2024/1252

Results of the 2023 EU criticality assessment from European Commission "Study on the Critical Raw Materials for the EU 2023"

Critical Raw Materials Act

Critical Raw Materials are concerned by specific policy measures:

- incentivation of **technological progress** and **resource efficiency**
- establishment of “Points of Single Contact” to **facilitate and coordinate permitting of installations** for “extraction, processing or recycling” of CRMs
- project planning **simplifications**
- national **exploration programmes** for CRM resources
- EU **monitoring** of CRM trade flows and obstacles
- identification and monitoring of key **value chain operators**

Critical Raw Materials Act

Critical Raw Materials are concerned by specific policy measures:

- incentivation of **technological progress** and **resource efficiency**
- establishment of “Points of Single Contact” to **facilitate and coordinate permitting of installations** for “extraction, processing or recycling” of CRMs
- project planning **simplifications**
- national **exploration programmes** for CRM resources
- EU **monitoring** of CRM trade flows and obstacles

- identification and monitoring of key **value chain operators**
- (within 2 years) national programmes for **circularity of CRMs**
- analysis of operating and closed sites to define CRM **recovery potential from extractive waste**
- implementing acts defining a “list of products … and waste streams … considered as having a **relevant CRM recovery potential**”
- possible **sustainability certification** and environmental footprint schemes for CRMs

List of STRATEGIC raw materials

(a) bauxite/alumina/aluminium
(b) bismuth
(c) boron — metallurgy grade
(d) cobalt
(e) copper
(f) gallium
(g) germanium
(h) lithium — battery grade
(i) magnesium metal
(j) manganese — battery grade
(k) graphite — battery grade
(l) nickel — battery grade
(m) platinum group metals
(n) rare earth elements for permanent magnets (Nd, Pr, Tb, Dy, Gd, Sm, and Ce)
(o) silicon metal
(p) titanium metal
(q) tungsten

The list of strategic raw materials should contain raw materials that are of high strategic importance for the functioning of the internal market, taking into account their use in ***strategic technologies*** *underpinning the*

- *green and digital transitions*
- *defence applications*
- *aerospace applications.*

EU Regulation 2024/1252

List of STRATEGIC raw materials

(a) bauxite/alumina/aluminium
(b) bismuth
(c) boron — metallurgy grade
(d) cobalt
(e) copper
(f) gallium
(g) germanium
(h) lithium — battery grade
(i) magnesium metal
(j) manganese — battery grade
(k) graphite — battery grade
(l) nickel — battery grade
(m) platinum group metals
(n) rare earth elements for permanent magnets (Nd, Pr, Tb, Dy, Gd, Sm, and Ce)
(o) silicon metal
(p) titanium metal
(q) tungsten

The list of strategic raw materials should contain raw materials that are of high strategic importance for the functioning of the internal market, taking into account their use in ***strategic technologies*** *underpinning the*

- *green and digital transitions*
- *defence applications*
- *aerospace applications.*

EU Regulation 2024/1252

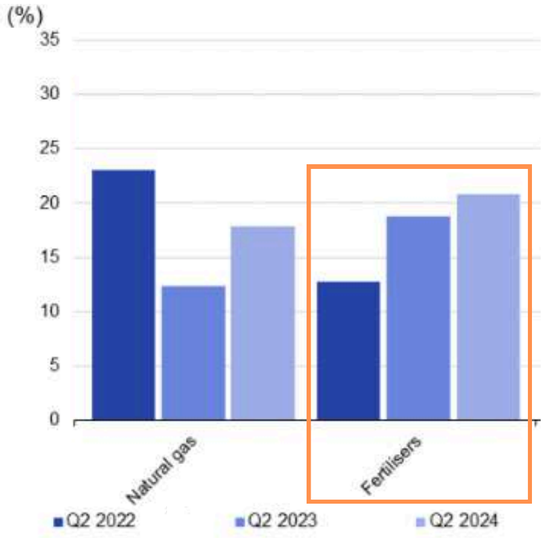
"Phosphorus" and "phosphate rock" are not in the "strategic raw materials" sub-list, so are **not eligible** for:

- Strategic Projects
- Joint Purchasing
- recycling and supply targets

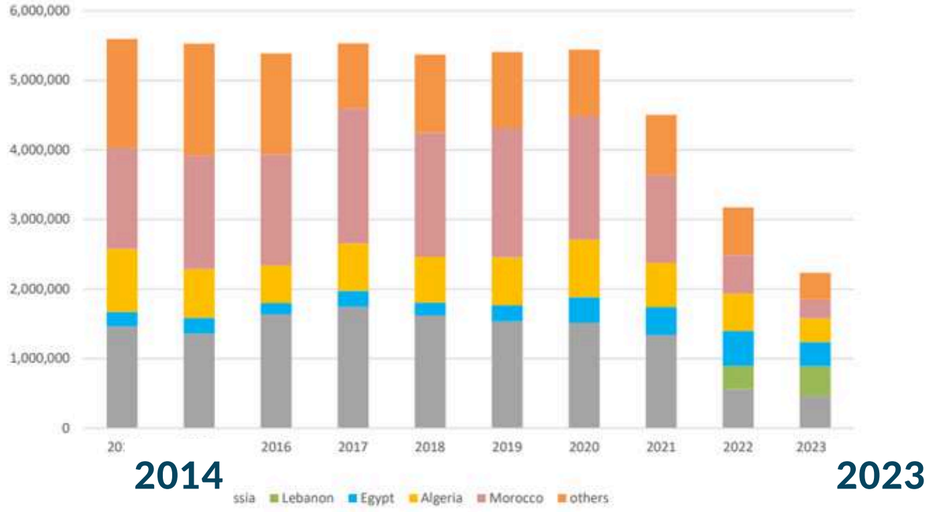
CRITICALITY OF “PHOSPHATE ROCK”

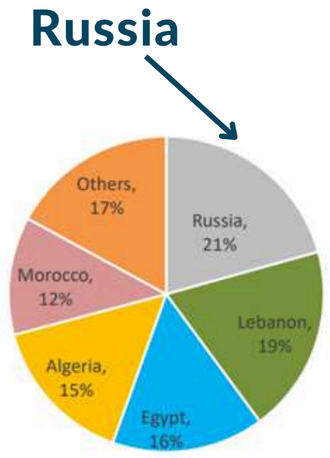
(covering P in different forms in fertilisers, animal feed, chemicals and other uses)

- EU continues to import **Russian phosphate** - Russia today still accounts for around one fifth of EU fertiliser imports (N, P and K)
- Other phosphate rock importers are **Lebanon, Egypt, Algeria, Morocco**



[Eurostat]



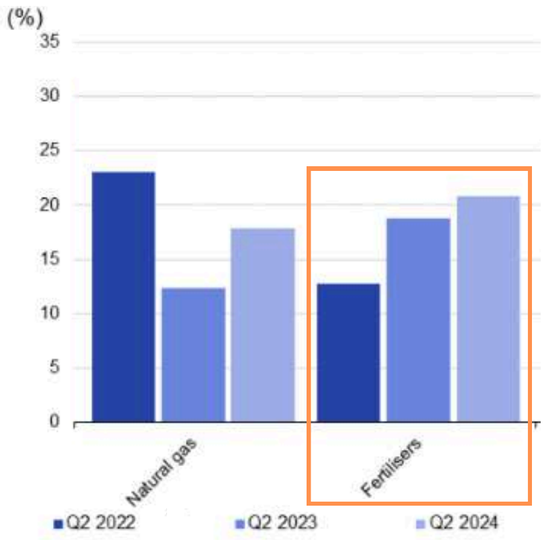


[2023 Phosphate rock imports (agridata.ec.europa.eu)]

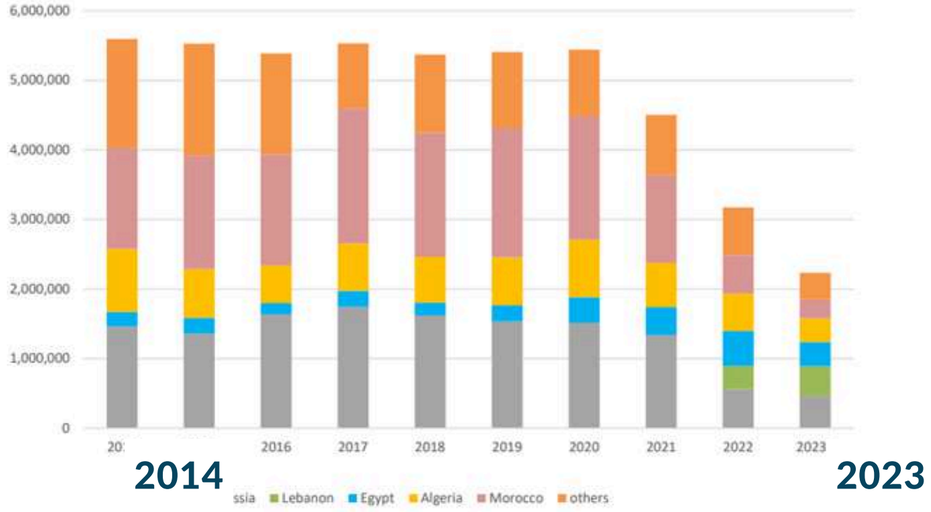
CRITICALITY OF “PHOSPHATE ROCK”

(covering P in different forms in fertilisers, animal feed, chemicals and other uses)

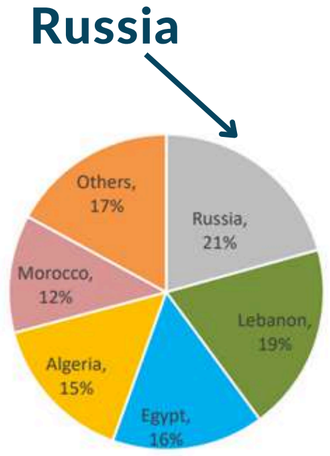
- EU continues to import **Russian phosphate** - Russia today still accounts for around one fifth of EU fertiliser imports (N, P and K)
- Other phosphate rock importers are **Lebanon, Egypt, Algeria, Morocco**



Eurostat



2023 Phosphate rock imports (agridata.ec.europa.eu)



Food security should also be recognised as “Strategic” for Europe

CRITICALITY OF P_4 AND PURIFIED PHOSPHORIC ACID

Elemental phosphorus (P_4) and Purified Phosphoric Acids (PPA) are essential for all of the "Strategic" industry sectors defined by the EU in the proposed Critical Raw Materials Act: ***batteries, renewable energies, electronics and data, aerospace***

	ELEMENTAL PHOSPHORUS (P4)	PURIFIED PHOSPHORIC ACID
BATTERIES	Lithium ion battery electrolytes ($LiPF_6$)	Lithium iron phosphate battery cathodes ($LiFePO_4$)
ELECTRONICS	Microchip production	P-acid fuel cells
	Semiconductors doping	Steel anticorrosion
	PV doping of n-silicon	
	Lubricants for jet engines	
	Fire safety of polymers, composites, natural and synthetic fibres, wood, batteries, hydraulic fluids, ...	

CRITICALITY OF P_4 AND PURIFIED PHOSPHORIC ACID

ELEMENTAL PHOSPHORUS (P_4)

- Specific form of phosphorus, produced only in dedicated P_4 -**furnaces**
- Represents a few percent of world phosphate rock consumption (**2-3%**), but is **irreplaceable** for the production of specialist phosphorus chemicals
- There is today **no P_4 furnace in Europe** (the last one closed in 2012)
- The EU is **100% dependent on imports**, entirely from

CHINA
VIETNAM
KAZAKHSTAN

PURIFIED PHOSPHORIC ACID

- Use of P rock in batteries and fuel cells expected to remain a small proportion of total mined rock
- The EU faces **high supply risk for the Purified Phosphoric Acid (PPA)** needed for “strategic” technology applications
- “Green” acid purification to obtain PPA requires technologies and installations
- A **30% to 50% increase** in global phosphoric acid purification capacity is needed to supply PPA for batteries and fuel cells

CORRESPONDING TO A GLOBAL INVESTMENT OF NEARLY 20 BILLION €

FIRE SAFETY

Fire safety is vital for ‘strategic technologies’

- batteries, renewable energy, electrical systems, circuit boards, electronic, power and data cables, aerospace, to avoid halogenated flame retardants
- polymers and composites are flammable
- major and far-reaching impacts of fire impacts: immediate loss of communications, power or data; fire spread through power or data cables; heat release and toxicity in e.g. battery
- consequences on people and environment

Fire in OVHcloud Data Centre (2021).Data center outages cost hundreds of thousands €/hour, risk data loss, and damage equipment. Flammable materials like PCBs, cables, batteries, and insulation can ignite due to overheating, electrical failures, or battery issues. Major fires have affected Google, Apple, Samsung, and others. Flame retardants are essential to prevent fires and stop their spread. Source

FIRE SAFETY

**Phosphorus (in particular P_4) derived chemicals are the most effective fire safety solutions.
They can achieve fire safety standards in performance materials, including in end-of-life recycling for many sectors if halogens (brominated flame retardants, FR) are not used.**

EU regulation is pushing to eliminate brominated FR

- WEEE waste electrical equipment directive requires separation of end-of-life plastics containing brominated FRs
- EcoDesign for TVs/displays bans brominated FRs in certain parts
- Manufacturers are moving away from brominated FRs, https://www.apple.com/environment/answers/

7. Does Apple restrict brominated flame retardants (BFRs) and polyvinyl chloride (PVC) from its products?

Yes. Apple defines a material as BFR-free and PVC-free if there is no intentional use and it otherwise contains less than 900 parts per million (ppm) of bromine and of chlorine. Apple led the industry in the phaseout of BFRs and PVC, and this 900-ppm limit is now standard in the electronics industry. If BFRs or PVC were present, the bromine or chlorine levels would need to be significantly higher than 900 ppm in order to be effective.

Apple's phaseout of BFRs and PVC covers all new Apple product designs manufactured since 2009, all Beats products manufactured since 2016, and Beddit Sleep Monitors manufactured since late 2018. While Apple's phaseout covers the vast majority of products and components, some older Apple product designs may not be fully BFR-free and PVC-free. However, these products, including their replacement parts and accessories, were still designed to meet regulatory requirements.

Power cords in Thailand, India, and South Korea contain PVC due to country-specific requirements. We continue to seek approval for our PVC replacement.

P_4 CIRCULARITY

Recycling from sewage sludge incineration ash or meat and bone meal ash is an advanced sector, with a number of technologies under development or implementation to recycle P in different forms (e.g. as fertiliser or as phosphoric acid)

- Technologies are also being proposed to **produce P_4 from such ashes**
- This would be **upcycling**, in that a higher value and higher quality material (P_4) would be produced than the initial ones (fertiliser phosphates or organic phosphates)
- Recycling of P from many P_4 end-uses is either complicated, or represents just a very small part of the larger cycle of fertilisers, feed and food phosphorus

RecoPhos website

FlashPhos website

JOINT DECLARATION

calling for phosphorus (P_4 and derivates, Purified Phosphoric Acid) to be in the EU Strategic Raw Materials List

V17/7/23

Why should Elemental Phosphorus (P_4) and Purified Phosphoric Acid (PPA) both be on the EU list of "Strategic Raw Materials" ?

Elemental phosphorus (P_4[1]) and PPA are essential for all of the "Strategic" industry sectors defined by the EU in the proposed Critical raw Materials Act: batteries, renewable energies, electronics and data, aerospace.

Without them it is impossible to manufacture chemicals necessary for:

- **Batteries**: lithium ion battery electrolytes ($LiPF_6$)*, lithium iron phosphate battery cathodes ($LiFePO_4$)**.
- **Electronics**: microchip production*, semiconductors doping*.
- **Photovoltaic panels (PV)**: doping of n-silicon*.
- P-acid **fuel cells****
- Lubricants and **hydraulic fluids** (power and control systems)*.
- Steel **anticorrosion****.
- **Fire safety** of polymers, composites, natural and synthetic fibres, wood, etc. ***

* elemental phosphorus (P_4 and derivates) ** purified phosphoric acid *** both

Electrical and electronic equipment, data systems, renewable energy systems, batteries, aerospace: these all need phosphorus-based flame retardants to meet fire safety requirements. This is crucial to meet obligatory safety standards (in 'Strategic' sectors, for example in electrical and electronic equipment[2], or in transport uses[3]) and to achieve proactive industry safety specifications.

Fire safety requirements and the need for phosphorus flame retardants are increasing for all of the "Strategic" industry sectors, due to fire risks related to batteries, ubiquitous electronics (connectedness of things), data transmission dependency. Phosphorus flame retardant demand is growing 6-8% per year[4].

The EU is 100% dependent on imports of elemental phosphorus (P_4), and supply is almost entirely limited to three countries: China, Vietnam (largely dependent on electricity from China) and Kazakhstan. Furthermore, investment of around 20 billion € in phosphoric acid purification capacity is needed to supply PPA for "Strategic" industries in coming decades.

Including Elemental Phosphorus (P_4) and PPA (Purified Phosphoric Acid) in the "Strategic Raw Materials" list would allow "Strategic Projects" and appropriate company cooperation to re-establish P_4 production in Europe and to invest in acid purification capacity. **An EU-funded project is developing technology to produce high-quality P_4 from wastes**[5]. Inclusion of Elemental Phosphorus in the "Strategic Raw Materials" list would enable the public-private cooperation necessary for industrial implementation. This could enable the EU to achieve independence in P_4 supply. Several technologies are also today being implemented[6] to recover high-quality phosphoric acid (PPA) from sewage sludge incineration ash and other wastes, with significant development potential.

The signatory organisations and companies therefore request the European Parliament and Council to amend the proposed Critical Raw Materials Act COM(2023)160 (Annex 1, §1) to add to the list of "Strategic Raw Materials"[7]:

- **Elemental Phosphorus (P4 and derivates),** and
- **Purified Phosphoric Acid**

[1] Elemental phosphorus = P_4 (also called "white" or "yellow" phosphorus) and derivates
[2] IEC standards: International Electrotechnical Commission https://www.iec.ch/
[3] Strict fire safety standards apply in transport, eg. IMO for shipping, FAA for aviation, EN45545 for railways
[4] Summary of a number of market studies in pinfa Newsletter n°148 www.pinfa.eu
[5] Flashphos P4 recovery from e.g. from sewage sludge and incineration ashes.
[6] Nutrient recycling technology catalogue : https://www.phosphorusplatform.eu/techcatalogue
[7] Both "Phosphorus" (meaning P_4) and "Phosphate Rock" (effectively meaning phosphoric acid) are already on the "Critical Raw Materials" list. They should now be also included in the "Strategic Raw Materials" list.

V17/7/23

Signatories:

European Sustainable Phosphorus Platform www.phosphorusplatform.eu Contact: Robert van Spingelen, President president@phosphorusplatform.eu	European Sustainable Phosphorus Platform
German Phosphorus Platform DPP www.deutsche-phosphor-plattform.de Contact: Tabea Knickel info@deutsche-phosphor-plattform.de	DEUTSCHE PHOSPHOR PLATTFORM
Nutrient Platform Netherlands www.nutrientplatform.org Contact: Denis Banuoku d.banuoku@nwp.nl	NUTRIENT PLATFORM NL
ESIA (European Semiconductor Industry Association) https://www.eusemiconductors.eu/esia Contact: Philipp Saueracker philipp.saueracker@eusemiconductors.eu	ESIA European Semiconductor Industry Association
pinfa (Cefic Sector Group) www.pinfa.eu Contacts: Esther Agyeman – Budu esb@cefic.be Francesca Filippini ff@cefic.be	pinfa
Phosphonates Europe(Cefic Sector Group) www.phosphonates.org Contact: Peng Paternostre ppa@cefic.be	PHOSPHONATES EUROPE
incopa (Cefic Sector Group) www.incopa.org Contact: Peng Paternostre ppa@cefic.be	incopa
PAPA (Cefic Sector Group) https://specialty-chemicals.eu/papa/ Contact: Miguel Angel Prieto Arranz MAP@cefic.be	PAPA Phosphoric Acid & Phosphates
ICL https://www.icl-group.com/ Contact: Sander Kroon Sander.Kroon@icl-group.com	ICL
Clariant www.exolit.com Contact: Adrian Beard adrian.beard@clariant.com	CLARIANT
Yara www.yara.com Contact: Luc Haustermans luc.haustermans@yara.com	YARA
Norgemining https://norgemining.com Contact: John Vergopoulos, jv@norgemining.com	Norge Mining

V17/7/23

Italmatch Chemicals www.italmatch.com Contacts: Norberto Gatti n.gatti@italmatch.com, Galeano Carlos c.galeano@italmatch.com	Italmatch Chemicals
Prayon SA www.prayon.com Contacts: Alain Germeau, agermeau@prayon.com, Hubert Halleux hhalleux@prayon.com	PRAYON
Lanxess https://lanxess.com/ Contact: Karsten Job Karsten.job@lanxess.com	LANXESS
PCC Rokita https://en.pcc.rokita.pl Contact: : Jerzy Kowalski Jerzy.Kowalski@pcc.eu	pcc ROKITA
University of Stuttgart https://flashphos-project.eu Contact: Matthias Rapf matthias.rapf@iswa.uni-stuttgart.de	University of Stuttgart Germany
Department of Power Engineering, UCT Prague www.uen.vscht.cz Contacts: Michael Pohořelý Michael.Pohorely@vscht.cz	Department of Power Engineering UCT PRAGUE
Politecnico di Milano www.polimi.it Contact: Andrea Turolla andrea.turolla@polimi.it	POLITECNICO MILANO 1863
Proman www.proman.pro Contact: Ludwig Hermann l.hermann@proman.pro	PRO MAN
Alma Mater Studiorum- Università di Bologna www.unibo.it Contacts: Claudio Ciavatta, Dario Frascari isb@unibo.it	ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA
SNB (N.V. Slibverwerking Noord-Brabant) www.snb.nl Contact: S.F. Bombeeck bombeeck@snb.nl	snb
MITechnology www.mitechnology.at Contact: Alfred Edlinger alfred.edlinger@mitechnology.at	

WE ARE ALSO WORKING ON

Open to comments (send to info@phosphorusplatform.eu)

Possible phosphorus "reuse and recycling" rates under the revised EU Urban Waste Water Treatment Directive (UWWTD)

SCOPE Newsletter 151

Policies to support market uptake of recycled nutrients (market pull policies)

SCOPE Newsletter 151

- Recycled fertilisers in Organic Farming
- Definition of bio-based nutrients
- End-of-Waste status of algae and plants grown using wastewater, manures, digestates
- ...

...on ESPP Website.

UPCOMING ESPP EVENTS

13 NOVEMBER 2024 *Brussels*	JANUARY 2025 *Brussels*	5-7 MARCH 2025 *Saint Malo, Brittany*	17-19 JUNE 2025 *Norway*
End-of-Waste and other regulatory questions around algae and biomass grown using wastewater, manure, digestate or waste offgases	Stakeholder meeting on EU Circular Economy Act and Common Agricultural Policy	Sustainable nutrients management in intensive livestock (with the uPcycle project by UNEP-UKCEH)	Nutrient recycling in aquaculture (with the uPcycle project by UNEP-UKCEH)

ESPP events

CONTACTS

VERONICA SANTORO

Brussels Representative

veronica.santoro@phosphoruplatform.eu

CHRIS THORNTON

Secretariat

info@phosphoruplatform.eu

ROBERT VAN SPINGELEN

President

president@phosphoruplatform.eu

Linkedin
Slideshare presentations
Twitter
YouTube

SCOPE newsletter
eNews newsletter
Subscribe to ESPP's SCOPE Newsletter and eNews (same emailing list)

Thank You

PIATTAFORMA ITALIANA DEL FOSFORO

15
P
Phosphorous

info@piattaformaitalianafosforo.it

piattaformaitalianafosforo.it

La Piattaforma Nazionale del Fosforo
è una iniziativa promossa dal
Ministero dell'Ambiente e della Sicurezza Energetica