

pinfa input to the European Commission's [public consultation](#) on Critical Raw Materials Act

The Phosphorus, Inorganic and Nitrogen (PIN) Flame Retardants Association, pinfa, www.pinfa.eu regrets that **“Phosphorus” (meaning elemental phosphorus, P4 and derivatives) is not listed in the proposed Critical Raw Materials Act as a Strategic Raw Material**, as the substance/component is crucial for fire safety in batteries, renewable energy, electrical systems, circuit boards, electronic, power and data cables, aerospace, to avoid halogenated flame retardants.

Potential fire risks are increasing with energy storage in batteries, decentralised high-power renewable energy production, and with ubiquitous electronics and connected systems, as well as with use of polymers, composites, renewable fibres and biobased materials, all of which are flammable, for design and performance, electrical insulation, lightweighting and life-cycle objectives.

The EU needs to ensure supply security of phosphorus (P4/derivatives), to produce phosphorus-based flame retardants (FR), or manufacture in Europe of equipment for the Strategic Sectors targeted in the CRM Act conform to international fire safety standards will be compromised. **Phosphorus-based flame retardants can achieve fire safety standards in performance materials whilst ensuring health and environment safety, including in end-of-life recycling.** Without phosphorus-based flame retardants (often in synergy with nitrogen or inorganic flame retardants), fire safety standards and performance requirements can often not be met without going backwards to halogenated chemicals (brominated or chlorinated flame retardants or polymers).

Phosphorus has one of the highest import insecurities of all EU Critical Raw Materials (CRM) and the highest supply risk of all raw materials for batteries (JRC report p20). There is no P4 production in Europe. Europe is 100% dependent on imports from three countries: China, Vietnam (dependent on energy from China) and Kazakhstan.

The European Commission preparatory document ([JRC Foresight Report 2023](#)) identifies that **“phosphorus” is crucial for fire safety, but only in data storage and servers (page 90). This is correct, but it is important to also consider its use in fire safety for computers, wind turbines, photovoltaics, heat pumps, electrical and electronic equipment, data and power cables, space-satellites, 3D-printing, etc.** In all these strategic sectors, fire safety is also necessary, and phosphorus flame retardants are similarly crucial to enable this.

Phosphorus-based flame retardants for polymers, composites, battery electrolytes and fibres are dependent on the CRM “Phosphorus” (P4/derivatives) for their production. These phosphorus-based FRs offer a wide range of chemical and performance properties. A number have been validated as low-risk and preferable for use by independent assessments (Denmark EPA Lous 2016, ENFIRO 2013, LIFE-FLAREX 2018, GreenScreen, Öko-Tex, TCO) including e.g. aluminium diethylphosphinate AlPi, ammonium polyphosphate,



melamine polyphosphate, red phosphorus, DOPO which are widely used in electronics, battery systems and performance materials (see www.pinfa.eu/media-events/pinfa-academy).

pinfa notes that, in addition to being crucial for fire safety in most of the strategic industry sectors targeted by this Act, phosphorus is also key for electronics manufacture (semiconductor doping, chip etching) and for the electrolyte of lithium-ion batteries (LiPF6).

pinfa suggests that “Phosphorus” should be included in the list of Strategic Raw Materials. Annex I Section 1 should be modified to add: “Phosphorus (P4 and derivatives)”.

Further information on PIN fire safety (phosphorus, inorganic, nitrogen flame retardants), visit www.pinfa.eu

For more information please contact:
Esther Agyeman-Budu, Sector Group Manager, Cefic,
eab@cefic.be

About pinfa

pinfa is the Phosphorus, Inorganic and Nitrogen (PIN) Flame Retardants Association (a Sector Group within Cefic, the European Chemical Industry Council). www.pinfa.org We bring together (with pinfa North America and pinfa China) nearly 40 companies who manufacture or use non-halogenated flame retardants, smoke suppressants and synergists, based on chemistries of one or more of phosphorus, nitrogen and inorganics.