University of Stuttgart

Institute for Sanitary Engineering, Water Quality amd Solid Waste Management

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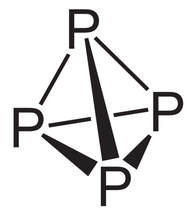
White Phosphorus from secondary resources: The H2020 project FlashPhos

Challenges for a European Circular Economy

- ***White phosphorus P_4***
  - Critical Raw Material
  - 10% of EU's P demand
  - Highly asked for in **chemical and metal industries** for food, pharmaceuticals, flame retardants, surface treatment
  - **Conventional P_4** production consumes high amounts of **resources** and **energy**, produces large quantities of **dangerous wastes**
  - **EU depending** on few autocratic countries (mostly Kazakhstan, Vietnam)



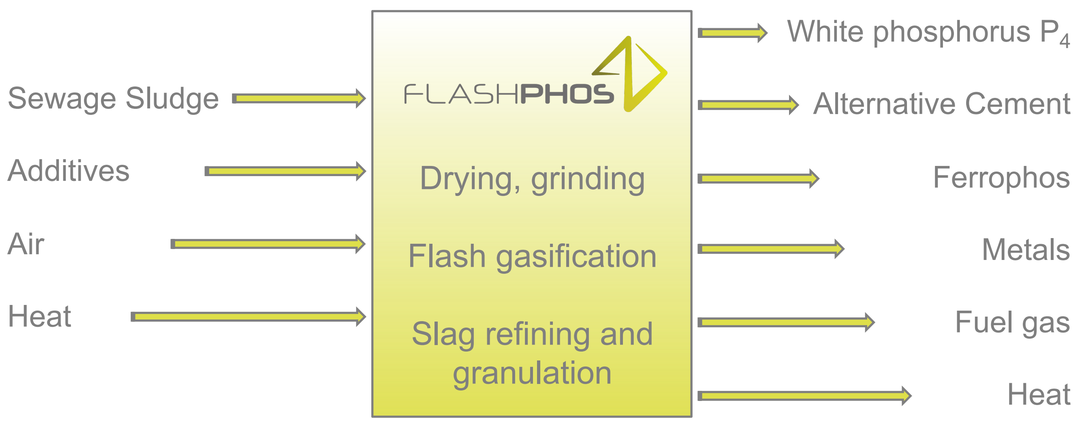
P4-Lewis Formula: Wikipedia, Author: NEUROtiker

- ***Sewage sludge (SSL)***
  - **inevitable** mass waste (ca. 50 Mt/a dewatered SSL in the EU)
  - High organic content, **no landfilling**, soil application prohibited in the medium term
  - **No** reliable future-proof SSL **disposal concept** in most EU countries
  - **Highest P-amount** in a single waste fraction
  - **P-recycling from SSL mandatory** in several EU countries very soon; planned for entire EU
  - So far **no** economically feasible P-recycling **technology available** worldwide

Tapping of Flash Reactor. Picture: Alfred Edlinger / Metallic and Inorganic Technology

Our Contribution – The EU-project FLASHPHOS

- ***Demonstration of process chain in pilot scale***
  - Using dewatered sludge from sewage plant
  - Using synergies with existing industrial plants



- ***Process optimisation towards Zero Waste***
  - High value output: **white phosphorus**
  - High mass output: slag ⟶ **alternative cement**
  - Ferrophos and other metals to metal industry
  - Fuel gas and waste heat to industrial host
- ***Significant CO_2 and energy savings***
  - FlashPhos more **energy efficient** than conventional P_4 production
  - Melting energy provided by sludge organics
  - FlashPhos cement emits **significantly less CO_2** than Portland cement
- ***Accompanying LCA and SEIA***
  - Cooperating LCA and SEIA accompanying process development from the start
  - Facilitating market introduction due to **optimal social and environmental compatibility**
- ***Introduction to phosphorus and SSL markets***
  - Selection of appropriate locations
  - **FlashPhos** suitable for all EU countries with industrial host plants = **for all EU countries**
  - Market introduction planned for 2028

coming soon:
www.flashphos-project.eu

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