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## Alternative sources of phosphorus for the fertilizer industry: from waste to valuable raw material

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Mineral phosphorus is a non-renewable resource that is constantly diminishing due to the intensive production of fertilizers. It absorbs nearly 90% of all extracted phosphorus resources, and therefore it is not possible to compensate for its shortages in this sector by shifting resources to other industries.



Current agricultural production depends on the use of fertilizers. The population is growing very fast and in order to meet its requirements, measures to intensify plant growth are necessary. Phosphorus, along with nitrogen and potassium, plays a key role here.

On the other hand, intensive farming can generate an excess of phosphorus in the soil, which can then migrate to nearby rivers and lakes, causing them to eutrophication.



In addition, economically viable phosphorus deposits are concentrated in only a few locations worldwide. It boils down to the fact that most countries are simply dependent on the import of this raw material. European countries are almost 90% dependent on the external market.

The key to maintaining the continuity of phosphorus flow is sustainable management and its effective recovery from the waste stream, which corresponds to the assumptions of the circular economy.

There are many potential sources of waste phosphorus, which, with the development of an effective technology for their processing, can significantly affect the economy of this element. Among wastes containing phosphorus, wastewater is of great importance, as it generates large amounts of sewage sludge and possibly ash from its incineration in the treatment process. Among industrial waste, phosphogypsum is the carrier of large amounts of phosphorus. Recently, a lot of emphasis has been placed on food waste in the context of the loss of valuable ingredients.

![](_page_0_Figure_14.jpeg)

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