

SUSTAINABLE RECOVERY AND REUSE OF PHOSPHORUS

This paper looks at the phosphorus challenge Europe is facing today, and highlights Kemira's knowledge and credentials to partner with European institutions and stakeholders to address it. This document also underlines how chemical treatment of wastewater and the use of coagulants to capture phosphorus are essential to meet EU policy goals from an environmental, energy efficiency, economic, employment and supply security perspective.

What is the phosphorus challenge?

Phosphorus is one of the vital building blocks for life, and is essential for food production, animal feed, and biofuels. 95% of the phosphorus we use is imported from outside the EU. We are also wasting what we have due to insufficient wastewater treatment and poor nutrient recycling. The wasted phosphorus in turn causes eutrophication in rivers, lakes and oceans resulting in algal blooms and depletion of oxygen in the water.

How to address this?

Chemical treatment, using coagulants, is the most effective and cost-efficient solution to capture and remove phosphorus from wastewater to make it available for recycling. Coagulants have been used for more than one hundred years to clean and purify water. Today, 75% of the coagulants used in municipal wastewater treatment plants are based on iron. Iron salts are also commonly used in biogas plants in order to enhance biogas production.

Iron coagulants play an essential role in our everyday lives. They are used to purify drinking water and treat wastewater. Furthermore, the raw materials used in iron coagulant manufacturing are in fact recycled from other industries. If these industrial by-products were not used for coagulant production, many would have to be disposed of. The use of iron coagulants must be continued since they are beneficial to Europe on five levels: 1) protecting the environment; 2) facilitating energy efficiency; 3) representing the most economically sound wastewater treatment solution for European industry; 4) helping secure Europe's supply of phosphorus; and 5) securing employment and growth in Europe.

1) Protecting the environment

Coagulants are needed to protect waterways. The improved water quality of Nordic rivers and lakes since the 1970s is a living example of how this has worked. Furthermore, with the use of coagulants, it is possible to go well beyond the requirements of EU legislation (1 mg of phosphorus/liter). The phosphorus level recommended by the HELCOM Baltic Sea Action Plan is 0.5 mg phosphorus/liter in released treated wastewaters. With chemical phosphorus removal, levels below 0.1 mg/liter in the effluent can be achieved. Another advantage of coagulant usage includes the fact that phosphorus precipitated sludge can be used as a fertiliser on farmland; the phosphorus is available to plants and crops but does not leak into the groundwater.

Furthermore, the sludge fulfils all quality requirements laid out in the EU Sludge Directive (86/278/EEC) - in addition to all more stringent national measures - concerning harmful heavy metals and contaminants. Even if the sludge did not meet the requirements to be used on agricultural land, it could be used as an alternative, cleaner phosphorus source instead of phosphate rock, since this rock contains higher levels of heavy metals.

Chemical treatment also has the lowest carbon footprint of all commercially available phosphorus removal/water treatment technologies. Furthermore, coagulants are manufactured from recycled raw materials from other industries. In 2012, for example, 26% of the 3.6 million tonnes of materials purchased by Kemira were recycled raw materials. As a result, we are turning industrial by-products into valuable products to protect water systems.

2) Facilitating energy efficiency

Compared to biological treatment, chemical treatment can save up to 50% of the energy required in biological wastewater treatment plants and more biogas can be produced at the same time. In short, rival technologies to the usage of iron coagulants require more energy to do the same job. This is damaging for Europe, particularly at a time when Europe faces an energy shortfall and prices for energy are continuing to rise for business and consumers alike.

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3) Economically beneficial

By using iron coagulant treatment in a wastewater plant, the investment costs as well as the operational energy costs are substantially reduced. If the use of iron coagulants would be stopped, these operations using iron coagulants will need to change their existing processes, at a great expense. Industrial customers, as well as many municipalities, would need to invest in biological treatment plants or other competing, less cost-efficient technologies and further weaken their financial situation.

4) Securing Europe's supply of phosphorus

It is crucial to Europe to secure its limited remaining supplies of phosphorus and not to waste what we currently have. We therefore need to improve our recycling efforts towards this goal. Currently, within Europe, we only recycle about 32% of the phosphorus available in wastewater. About 50% is disposed and the remaining part is found in wastewater after treatment. With the use of coagulants, 90% of the phosphorus lost with the treated water could be captured at the treatment plant. This share could also be recycled to agriculture. To exacerbate the current situation, Europe is 95% dependent on imports of phosphorus, and most of these come from Russia and Morocco. If a conflict with these countries arises, or political change, then we may face a catastrophic supply problem, which will affect Europe, and particularly the food chain.

5) Creating jobs and growth in Europe

The coagulants sector represents a European success story, creating employment for European workers and contributing to European competitiveness and growth. Kemira alone has 1,700 employees globally (with Europe as the base) in its Municipal & Industrial division, and there are around 50 producers situated all over Europe. In addition to this, coagulants manufacturing takes place locally, which means economic activity and employment is distributed across the whole EU, thus supporting European industry.

Other parts of the world are also aware of the importance of protecting the environment and managing limited resources. As a result, opportunities are created for European companies to sell their products and systems as well as to also provide consulting services to countries outside Europe. Moreover, by recycling phosphorus more intensively than we do today, we can safeguard a sustainable, efficient and well-functioning agricultural sector in the EU.

In conclusion, phosphorus is a precious resource that we should stop wasting. The use of coagulants helps Europe to meet this objective while protecting the environment in a safe, sustainable, secure and cost-efficient way. In addition, it creates employment and growth within the EU. This should therefore be reflected in the European policy and regulatory initiatives. These may range from new activities on phosphorus (for example, the 2014 legislative proposal on resource efficiency and waste) to the revision of existing legislation around Wastewater, Sludge, the Raw Materials Initiative as well as the Revision of the Fertilizer Regulation.

About Kemira

Kemira is a global chemicals company serving customers in water-intensive industries. We provide expertise and chemicals that improve our customers' water, energy and raw material efficiency. Our focus is on pulp & paper, oil & gas, mining and water treatment. In 2012, Kemira had annual revenue of EUR 2.2 billion and around 4,900 employees. Kemira shares are listed on the NASDAQ OMX Helsinki Ltd.

More detailed information on the statements presented in this this summary document including literature references to the relevant studies can be found in the complete Kemira Position Paper "Sustainable Recovery and Reuse of Phosphorus. Please contact sustainability@kemira.com for a copy of the complete document.

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