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INTERNATIONAL
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PHOSPHOGYPSUM Q&A

What is PG?

Gypsum is a mineral that occurs both naturally and as a co- or by-product of many industrial processes. It has a wide range of uses in industry and agriculture. Phosphogypsum (PG) refers specifically to the gypsum that is formed when phosphate ore is processed into fertilizer using sulfuric acid.

Is PG safe?

PG is a safe, reusable resource for which there are many beneficial uses. Phosphate rock is well-known for its variability and may contain trace quantities of many different elements some of which can be very beneficial in their own right, for example as nutrients to plants. PG may also contain low residual concentrations of naturally occurring radium from the source rock which must be characterized carefully before use. Depending on the levels, regulators may require some specific restrictions, as for example when used in residential buildings.

In 2013, the International Atomic Energy Agency (IAEA) published a report which concluded that PG was safe to use from a radiological perspective when its radionuclide activity concentration was 1 Bq/g or less. As almost all commercially produced PG globally has lower than 1 Bq/g activity, the IAEA advised that PG be classified as a co-product of phosphate fertilizer production and added that reusing it is environmentally preferable to disposing of it.

How is PG regulated?

The regulation of PG on a global level is still inconsistent. Until the IAEA Report was published in 2013, much of the PG produced globally was treated as a waste material on radiological grounds and was typically stacked in above ground storage facilities. Since 2013, however, a growing number of major PG producing countries such as Brazil, Canada, China, India, Russia, Morocco and Belgium have been working together with academia and the fertilizer industry to review and revise their approaches to its use.

Results are encouraging. Its global use is growing and is now at some 30% of production, with some countries, such as Belgium and Brazil, now reusing 100%. Where needed, regulations have been revised to encourage, or even require, its use instead of disposal, though always with the requirement for resource characterisation prior to use with independently validated results.

Why is there growing interest in PG reuse?

In the context of the UN's Sustainable Development Goals, and with an increased focus on a more circular economy, industries are developing a variety of technologies to reuse and recycle their secondary resources. Instead of treating PG as a waste product and keeping it in stacks where it can be complicated to manage, the fertilizer industry has been exploring different ways to process and reuse it. PG is increasingly being seen as a valuable resource.

What can PG be used for?

PG has a number of well-established uses and an ever-growing array of new ones. Combined, these proven and potential uses could consume most, if not all, of the PG produced annually. These include:

A. AGRICULTURAL

PG is a multi-nutrient sulphur-rich fertilizer. It can be used variously as a soil amendment to displace high levels of sodium or magnesium salts, improve soil structure and water retention, and neutralize subsoil acidity. PG is now also being mixed with soil to reclaim stacks by growing trees for green energy and other vegetation, in the process sequestering highly significant quantities of carbon.

B. BUILDING MATERIALS

PG can be turned into high-quality ornamental plaster and high-performance wallboard, as well as a range of other building materials including ceramics, flooring, decorative wall cladding and bricks. PG is also widely added to cement as a retardant to slow its setting time when mixed with water.

C. ROADS

PG is an excellent road-bed material, both in its own right and in combination with other industrial secondary resources, such as fly-ash, where it can help conserve up to 65% of primary resources such as aggregates and sand. PG offers high life-cycle performance, durability and resistance combined with a low overall lifecycle cost.



Are there protocols in place for sustainable PG management?

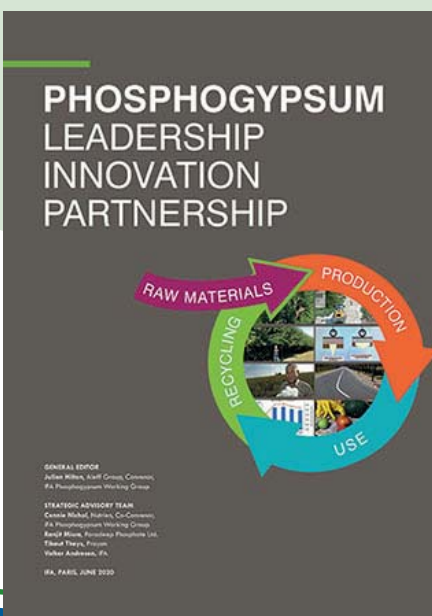
The fertilizer industry and other mining and processing operators are dedicated to ensuring that PG can be sustainably reused. In April 2018, IFA members agreed to develop and pilot a set of independent, peer-reviewed “Quality Protocols” for sustainable PG management and use.

These protocols will enable PG products to be used with confidence around the world, with the eventual aim of reusing 100% of all PG, both current production and resources stored in stacks in more than 50 different countries. This project will be undertaken in cooperation with the United Nations Economic Commission (Geneva), the United Nations University and the IAEA (Vienna).



How can I find out more about PG?

In 2020 IFA published a new [report](#) about the sustainable management and reuse of PG which explores its regulation around the world and looks at some of the many projects underway to harness PG as a resource. Additionally, this [infographic](#) looks in greater detail at some of the main ways in which it can be reused and [webinar](#) discusses Phosphogypsum Core Principles of Management and Use.



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