International Copper Association
Copper Alliance

FROM STONE TO STONE – THE CIRCULAR PATH OF IRON SILICATE

IRON SILICATE is a manufactured/engineered mineral comparable to natural mineral aggregates from quarries. It is produced during copper refining and recycling processes.

It can appear in three forms:

IRON SILICATE STONE
with edges up to 0.5m in length, comparable to igneous rock

IRON SILICATE GRANULATE
similar to natural volcanic glass (e.g. obsidian)

IRON SILICATE FINES
(fine powder), similar to mineral flour

Metal content within iron silicate is reduced to the lowest levels that are economically viable and technically feasible. This co-product is not only unavoidable, but also needed; it constitutes an integral part of the copper production process by facilitating the reactions needed for the production of metals.

In Europe, on average two tonnes of iron silicate[1] are generated per tonne of copper produced[2].

1. Estimate of 4 Mt in 2018 | 2. The amount marketed is in some cases up to 75% of the volume produced where in other cases it may be as low as 30%, indicating that there is an important market supply potential.

ROAD CONSTRUCTION, CEMENT and **ABRASIVES** are amongst the most widely used applications of iron silicate forms, often as a substitute for primary building materials. Other examples of uses are the following:

HYDRAULIC ENGINEERING

ROAD CONSTRUCTION

CEMENT PRODUCTION

CONCRETE PRODUCTION

ABRASIVES

CASE STUDY: Summary of Aurubis LCA Substitution Study CO_2 savings from use of iron silicate in the construction sector

ACTIVE CLIMATE PROTECTION

Per Year, iron silicate can save up to:

11,400 t CO_2
as an aggregate in road construction, by preventing the extraction of gravel in quarries

170,000 t CO_2
as a reactive mineral additive in blended cements

116,000 t CO_2
as a substitute for cement and crushed stone in concrete

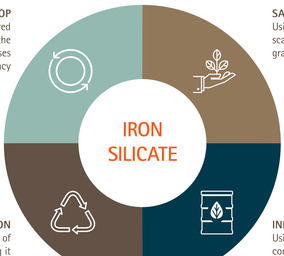
Baseline: Use of 1 million tonnes of gravel, cement, and concrete. Substitution of 100% gravel, 100% crushed stone, and 20% Portland cement by iron silicate.
source: www.aurubis.com/responsibility-x/environment--energy%5B2%5D/life-cycle-assessment-iron-silicate

All use cases show a positive contribution to reduce emissions in the building and construction sector.

There are positive results in all considered LCA impact categories in comparison to the substituted material for all substitution scenarios.

CLOSING THE LOOP
Using this valuable manufactured mineral actively contributes to the circular economy and increases resource efficiency

SAVING NATURAL RESOURCES
Using iron silicate helps to conserve scarce natural minerals such as gravel, sand, and mineral flour



WASTE PREVENTION
Iron silicate is an integral part of copper production; not using it would turn a sustainable product into waste for landfill

INDUSTRIAL SYMBIOSIS
Using manufactured minerals in the construction sector facilitates industrial symbiosis towards greater circularity and climate neutrality

The European Copper Institute is conducting research for 2021 (i.e. Life Cycle Assessment) on iron silicate from copper production to further explore the reduction potential of the industry's environmental footprint.

→ GET MORE INFORMATION ON THE COPPER ENVIRONMENTAL PROFILE