

Valorization of Iron Silicate at Aurubis

Webinar: The Successful International Path to
Enable the Use of Slags (Iron Silicate)

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 **Aurubis**



Agenda

1 Short Introduction to Aurubis

2 Iron Silicate Products and Applications at Aurubis

3 European and local Regulatory Environment

4 CO₂ Reduction Potential

5 Conclusions

Aurubis at a glance

Based in [Hamburg](#), Aurubis AG develops its leading market position with a [responsible approach](#) to the [environment](#), [people](#), and [resources](#)



The company's main expertise is in optimally [processing concentrates](#) and [recycling raw materials](#) with complex qualities

[Metallurgical know-how](#), [state-of-the-art plant facilities](#), and extraordinarily [high environmental standards](#) for the sector make Aurubis an attractive partner for raw material suppliers



The company, which was founded in 1866 as [Norddeutsche Affinerie AG](#), is listed in the [MDAX](#) and produces more than [1 million t of copper cathodes](#) and various copper products from them with [> 6,900 employees](#) worldwide



The Group is [active in more than 20 countries](#) and has production sites concentrated in [Europe](#) and [North America](#)



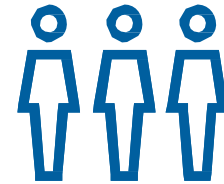
Aurubis is one of the world's leading producers of cathodes, rod, and flat rolled copper products

Aurubis: We are experts for metals.



Successful in
20 countries on
3 continents

> 6,900 x
passion and
engagement



158 years

of experience in the
production of non-
ferrous metals



One of the
worldwide leading
companies in
copper recycling

about **1 million t**

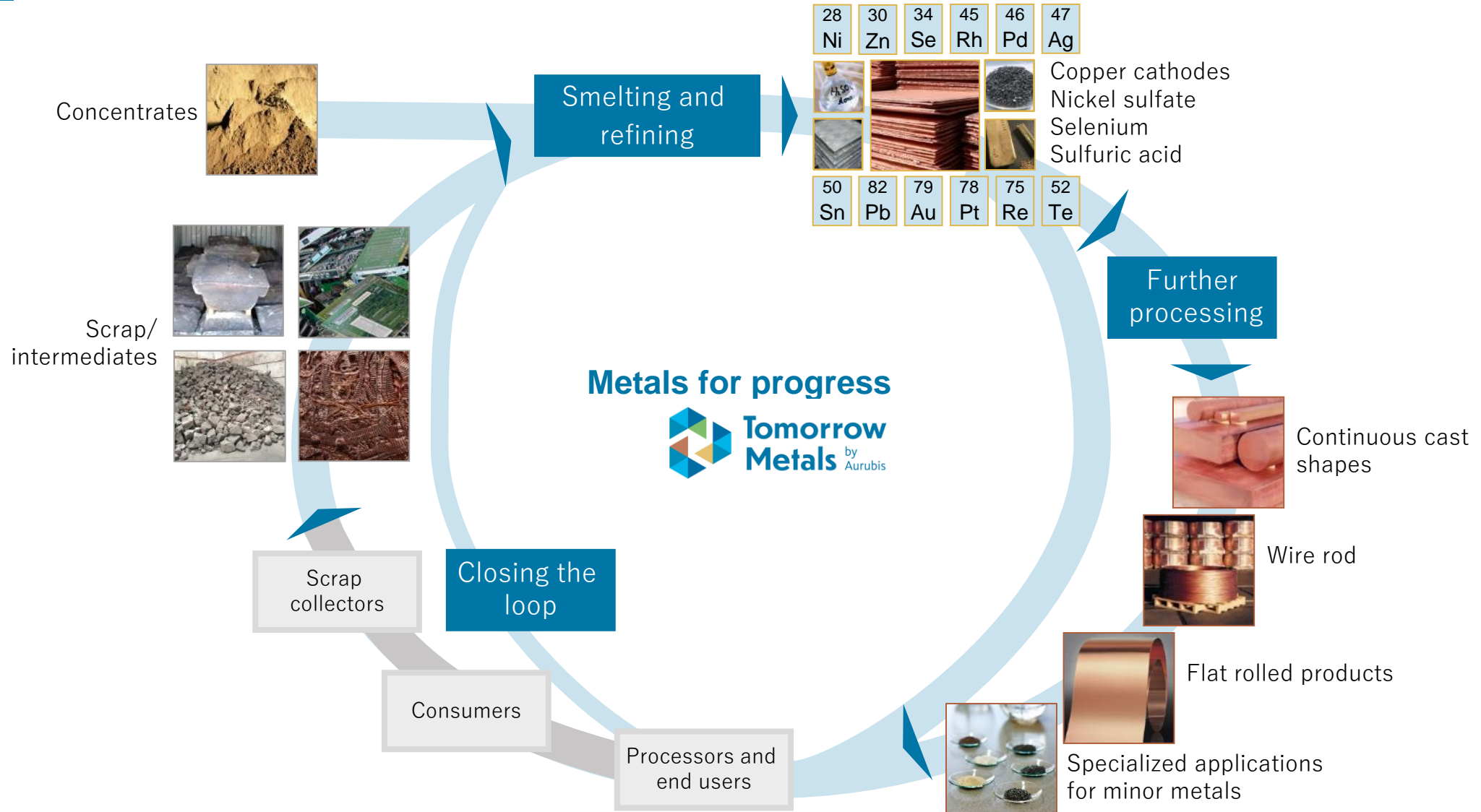


of recycling materials
are processed by Aurubis
on a yearly basis



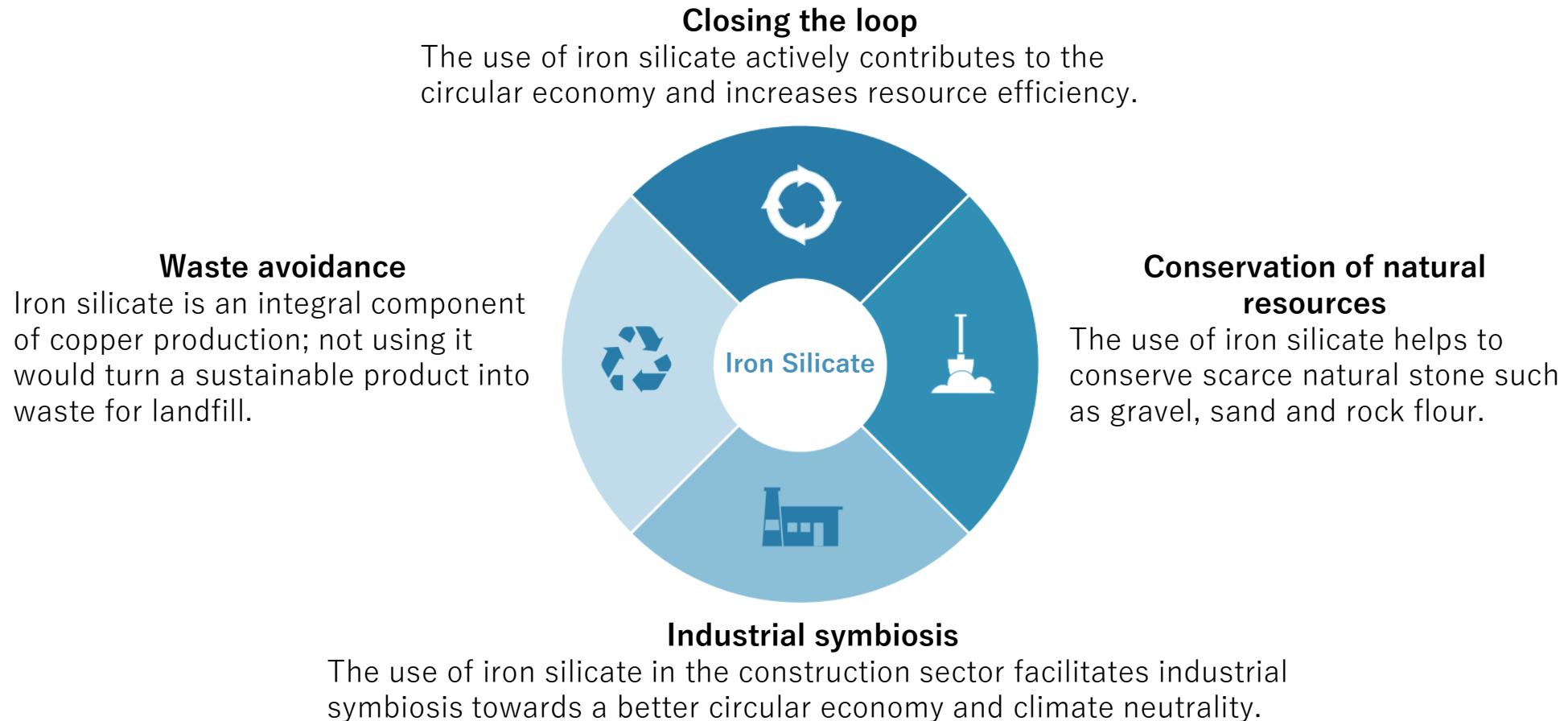
different **metals**
are recovered by
Aurubis

Closing the loop is part of Aurubis' integrated business model



Iron silicate: an industrially produced mineral as a by-product of copper production – the ideal product for circular economy

The use of iron silicate as a building material supports circular economy and contributes to climate protection.



Various applications for Iron Silicates have been established, mainly as construction material



Hydraulic Engineering

Armor stone for coastal and embankment protection or scour protection



Concrete

Iron Silicates can be used as a [coarse aggregate](#), or as a [filler](#) in the concrete mixture



Road Construction

Aggregates are used to create the base layer below closed top layers



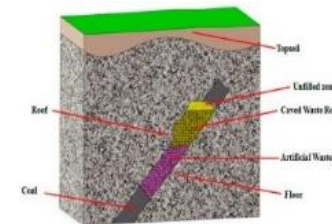
Blended Cement

Iron Silicates can potentially be used as binder for higher value [SCMs](#) ([supplementary cementitious materials](#))



Abrasives

After drying and screening material is used for corrosion protection as blasting grit



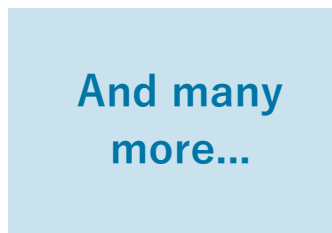
Soil stabilization / Landfill construction

Material is used for stabilization construction, e.g. Ski Centre Bottrop, and in the construction of landfilling bodies



Cement Clinker





Iron Silicates can be used as [iron corrector](#) in the process



Emerging markets

Ceramics, dry mixtures, asphalts, coal flotation

Iron Silicate Products in Aurubis Group

Site	Hamburg			Pirdop	Lünen	Beerse/Berango
Process	Primary				Recycling	
Product	Stones	Minerals	Granules	Fines	Granules	
						
Production Volumes	350 kt/a		400 kt/a	100 kt/a*	160 kt/a	220 kt/a
Applications						
– Hydraulic Engineering	✓					
– Road construction		✓			✓	✓
– Cement		✓	✓	✓		✓
– Concrete/Mortar		✓	✓	✓		✓
– Abrasive			✓			✓
– Landfill construction			✓		✓	
Sales volume with CO₂ reduction potential	750 kt/a					

* balance production of flotation plant is deposited

Aurubis uses concrete with Iron Silicate products as well for own projects – 2 examples

Foundations for the structure of the new solar park in Pirdop



Floor and water collection pit of the recently opened ASPA (Advanced Sludge Processing by Aurubis) plant in Olen



European and local regulatory environment for Iron Silicate materials - Examples




Application	EU Regulation	Local Regulation
Concrete		
Germany	– EN 12620 “Aggregates for Concrete”	Needs a general building authority approval which currently is not possible due to conflict with other German building regulations
Belgium		Possible with Product Declaration from local authority (OVAM)
Bulgaria		Possible under EN 12620 BG
Cement (SCM*)		
Germany	– EN 197-“Composition, specifications and conformity criteria for common cements”	Currently not listed
Belgium		Requires new Product Declaration from local authority (OVAM)
Bulgaria		ETA** established but not included in cement norms
Road Construction		
Germany	– EN 13242 “Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction”	Possible under “Substitute Construction Materials Regulation”
Bulgaria	– EN 13043 “Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas”	Currently not listed in BG

* Supplementary Cementitious Material

** European Technical Assessment

➤ Although some EU wide regulations support the use of iron silicate continued discussions with politicians and regulatory (local) bodies are necessary to convince about the valuable contribution iron silicate can make to circular economy, CO₂ reduction and preservation of natural resources

Use of iron silicate conserves natural resources and helps protect the climate by reducing CO₂ emissions

- It is impossible to generally calculate the CO₂ reduction from our iron silicate sales as this must be calculated case-by-case comparing the CO₂ impact from our products vs. the substituted products
- Exemplary calculations however show a great reduction potential for different applications*
 -  Building measure using 45,700 m³ of concrete with 20 % replacement of Portland cement and 100 % replacement of crushed natural stone
→ 12,000 t CO₂ reduction (≡ 26 % reduction)
 -  100,000 t Cement with a 20% replacement of Portland cement with Iron Silicate
→ 17,000 t CO₂ reduction (≡ 19.5 % reduction)
 -  Road construction with 1 Mio. t of natural stone replaced with Iron Silicate
→ 11,400 t CO₂ saving (≡ 87 % reduction)
- These examples do not take transportation into account. As CO₂ emissions from transportation can be significant (depending on the travel distance even higher than the CO₂ impact from product as such) a local use of Iron Silicate is preferable
- Aurubis is currently preparing and certifying the environmental impact of our iron silicate products over its lifetime via EPDs (Environmental Product Declaration)

* Source: Life cycle assessment of various substitution scenarios for iron silicate (Quantis (Technical Report, Sept 2020) / own Aurubis calculations)

Conclusions

- Iron silicate as an **industrially produced mineral** from the multi metal production at Aurubis is the ideal product to **foster circular economy and sustainability**
- It helps **conserve scarce natural resources** and **avoids landfilling**
- The use of Iron Silicate ensures a **clean a climate friendly multimetal production**
- **Life cycle assessment comparisons** and Environmental Product Declarations* (EPD) show a clear advantage of Iron Silicate compared to natural stones
- Additional **savings potential** is possible by a **partial replacement of Portland cement**
- A **local use** of Iron Silicate products is preferred as this **reduces the CO₂ impact from transportation**

* under preparation and certification

Iron Silicate from Aurubis – A By-Product with High Potential

