

CHARGING AHEAD

RESPONSIBLY. RELIABLY. RELENTLESSLY.

Sustainability and Resource Efficiency challenges for the industries: *Using Knowledge to Generate Value*

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Tech-check Expert Forum
14 October 2021



*Atlantic Copper
Smelter and Refinery*



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Atlantic Copper

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Atlantic Copper

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- Spanish Company belonging to the leading US natural resource company, Freeport-McMoRan
- Production of high-grade refined copper and sulfuric acid from ore mined in various parts of the World
- World-class competitive copper smelter & refinery in the port of Huelva, south-west Spain, which processes 1 MM tons of ore to produce 300,000 tons of refined copper annually
- Atlantic Copper is the largest copper producer in Spain and the third in Europe
- The direct, indirect and induced employment generated by the Company is estimated at nearly 3,000 jobs

The Process



Ore 0.5-2% Cu

Flotation

Concentrate 25-30% Cu

Smelting

Matte 65% Cu

Conversion

Blister 99% Cu

Refining & Casting

Anode 99.5% Cu

Electrorefining

Cathodes 99.99% Cu

Power Plant

Acid Plants

Sulphuric Acid (H₂SO₄)

Iron silicate

Electric Furnace

Anode slimes

Au, Ag, Pd, Pt, Se

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Productions & Sales in 2020

FUSION



CONCENTRATED

1.045.000
dtm

PRODUCTION



CATHODES

275.000
Ktm

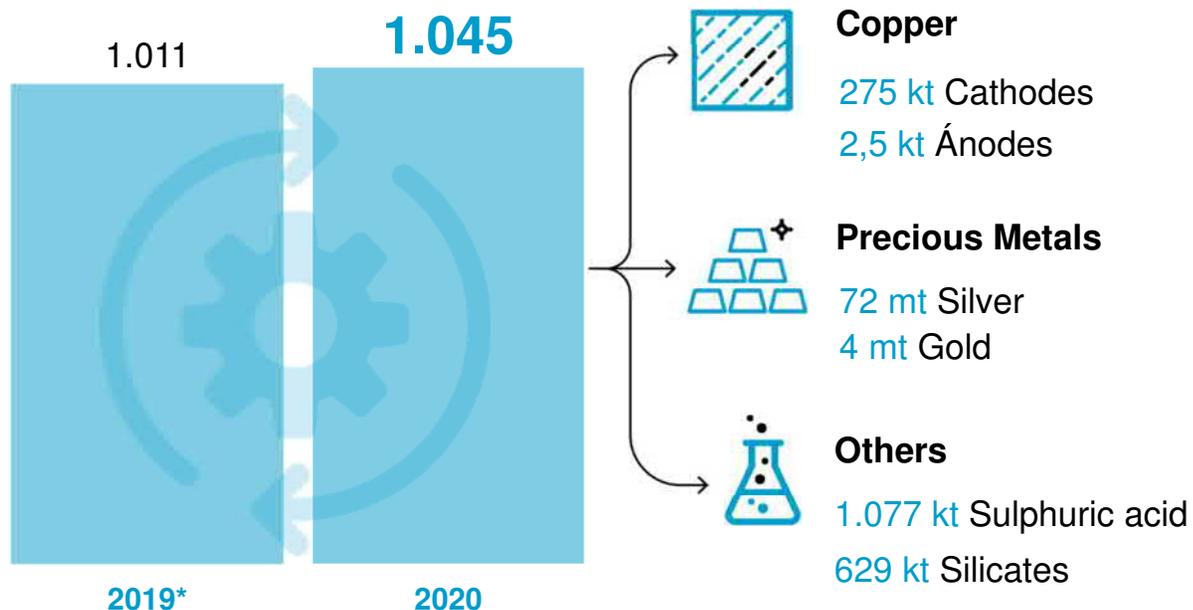


SULPHURIC ACID

1.035.000
Ktm

KDMT CONCENTRATED SMELTING

During 2020, despite the pandemic, the Company has achieved the fifth best record of the last 25 years in terms of concentrates fusion



* Includes impact from maintenance shutdown in those years



AC Sustainability Track Record

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Innovation to drive the Green Transition

- Atlantic Copper is ranked¹ as the world's lowest unit energy consuming copper smelter
- During the last 10 years:
 - 20% drop in unit energy consumption
 - 30% reduction in CO₂ GHG emissions
 - 34% reduction in SO₂ emissions
 - 59% reduction in particles emissions
 - 100 million euros of investment in energy efficiency and environmental protection
- Renewable energy sources account for 30% of Atlantic Copper's current electrical energy mix
- First European copper smelter to be awarded **The Copper Mark for responsible production practices**
- Atlantic Copper validates the rating in **ESG (Environmental, Social and Governance) performance** by Vigeo Eiris and Moody's.



¹Source: Wood MacKenzie, February 4th 2021. "Net Energy specific consumption (MJ/t Conc)"

Atlantic Copper: a reference

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How we got this achievements in sustainability indicators?



A TOOL for CHANGE

R&D&i

***R&D:** Applying
resources to generate
Knowledge*



***Innovation:** Using
Knowledge to
generate value*

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Staying One Step Ahead



- R&D plus Innovation play a crucial role in supporting Atlantic Copper's recent excellent production and results track record, focusing primarily on:
 - Technical knowledge management and industrial technological surveillance
 - Ensuring optimal and efficient plant performance
 - Identifying and developing technological improvement opportunities
 - Engaging grants and external funding
 - Annual R&D budget is approximately 1.5 million euros
- Current R&D plus Innovation initiatives cover important operational areas such as:
 - Sustainable operations: emission and effluent control, hazardous waste management
 - Operational efficiencies: energy management, metal recoveries, operational cost savings, production capacity
 - New business opportunities: management of impurities in copper concentrates (Bi/Sb removal plant), copper scrap treatment, by-product recoveries (Ni, Se, Te), waste stream valuation (Zn, In)

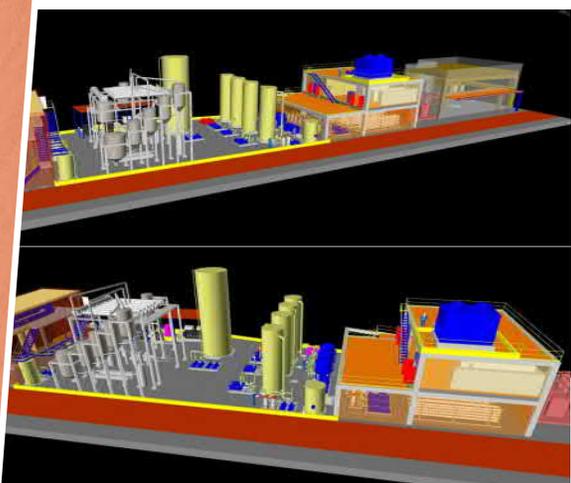
Examples of Resource Efficiency projects in industry

Innovation to drive the Green Transition



- **Recovery of Effluent Discharge for Sustainable Copper Processing in Europe**
- Pilot plant, funded by EIT Raw Materials, successfully completed in 2018 demonstrating the feasibility of a new innovative process to maximize wastewater recovery in a copper smelter

VIDEO



 **RED SCOPE**



EIT RawMaterials is supported by the EIT,
a body of the European Union

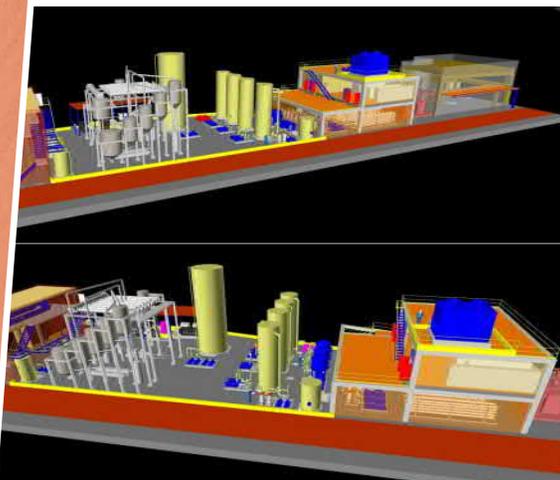
H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og

La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



- **Recovery of Effluent Discharge for Sustainable Copper Processing in Europe**
- Pilot plant, funded by EIT Raw Materials, successfully completed in 2018 demonstrating the feasibility of a new innovative process to maximize wastewater recovery in a copper smelter

VIDEO



- Full plant installation is now in progress, 24-month construction period
- Capital investment of 12.6 million euros
- The new plant will achieve a 25% saving in current freshwater usage

 **RED SCOPE**

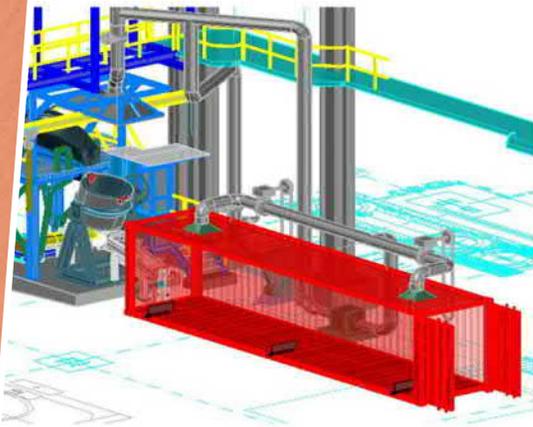


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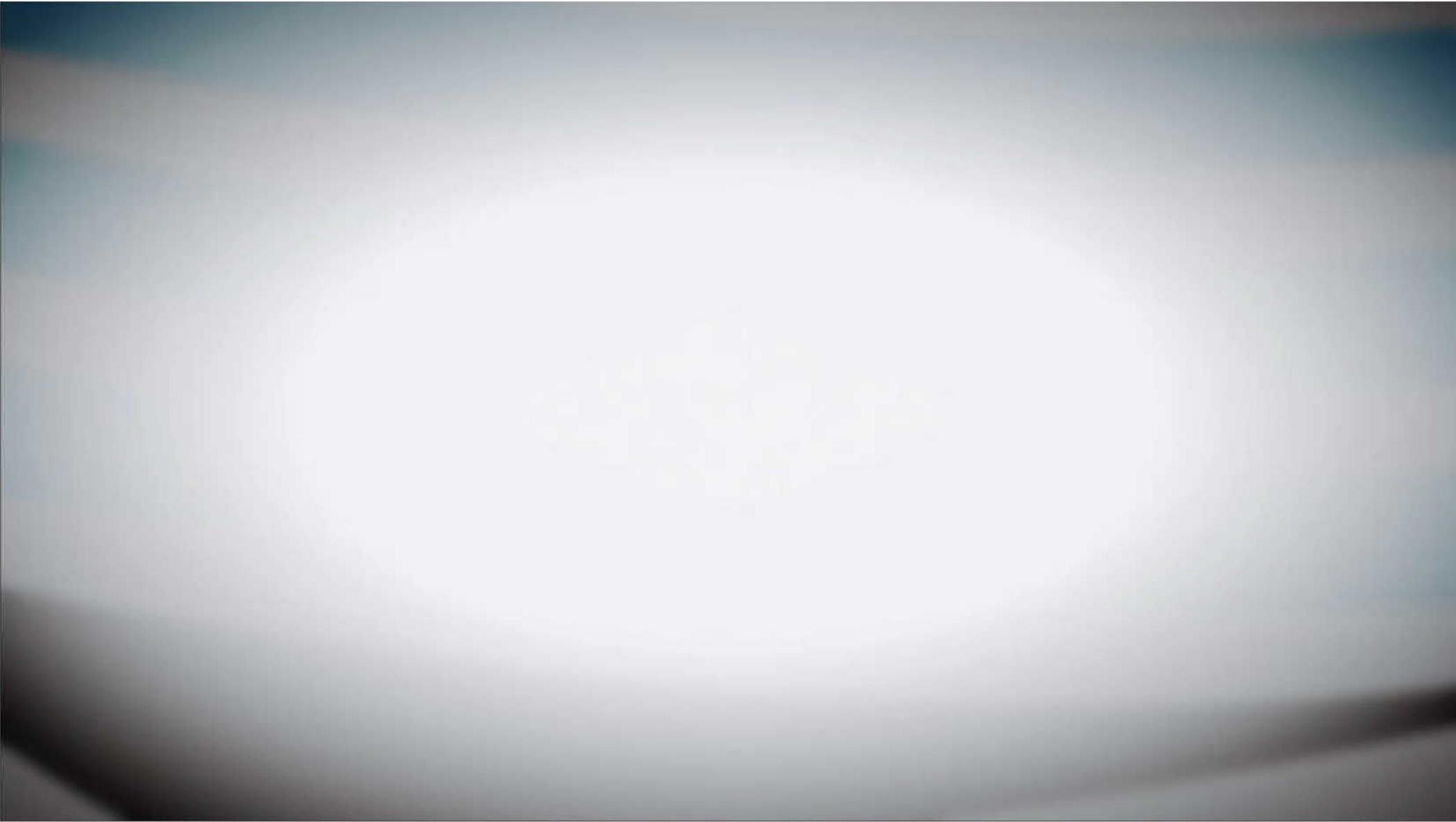
- **Waterless Iron Silicate Production with Energy Recovery**
- On-going pilot test, funded by EIT Raw Materials, aimed at validating an innovative and sustainable air-based pyrometallurgical system to produce iron silicate
- The new system will drastically reduce water consumption, recover significant amounts of energy and improve the quality of the iron silicate, adding value to the final product

VIDEO



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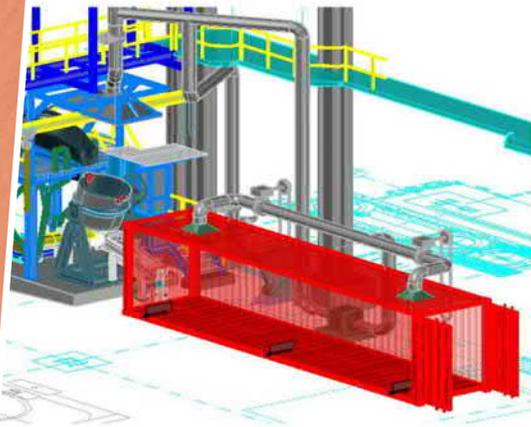






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VIDEO



- Full plant installation would require up to 25 million euros Capex
- Potential energy (37 GWh/yr) and water (150,000 m³/yr) savings would equate to around 3 million euros per year



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To conclude



- ❑ In Atlantic Copper we are very **committed** towards respect for the **environment, green transition and sustainability**.
- ❑ **Innovation** based to face efficiency resource and **circular economy** is without doubt a **key factor**.
- ❑ True sustainability in the industry **requires considerable efforts**: hardworking **people** involved in the projects and **investments in R&D** in order to generate knowledge that applied in the process directly impacts into the sustainability of the Copper Smelter&Refinery



Thanks



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DESDE 1970

ATLANTIC COPPER

Una compañía del grupo Freeport-McMoRan