

R&D for Sustainable Steel: Reimagining Tailings Through Innovation


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ArcelorMittal

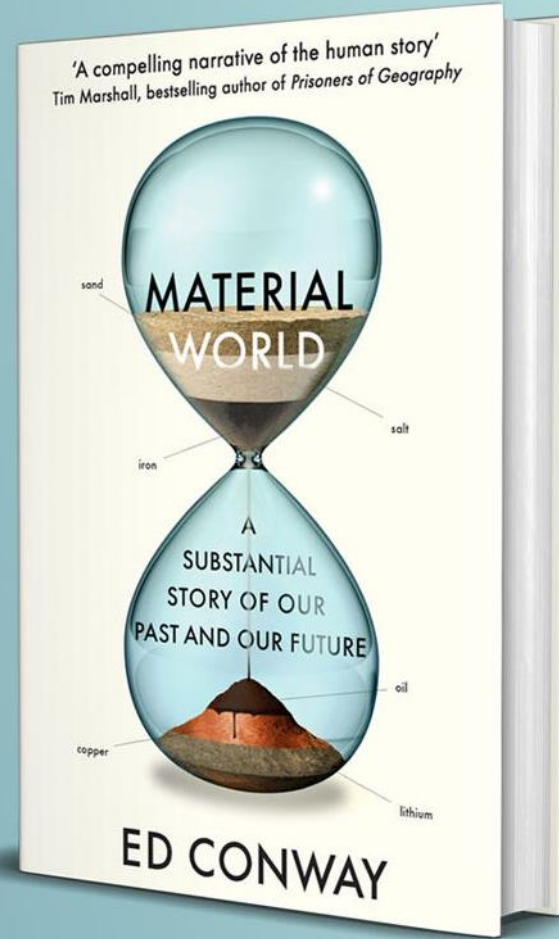
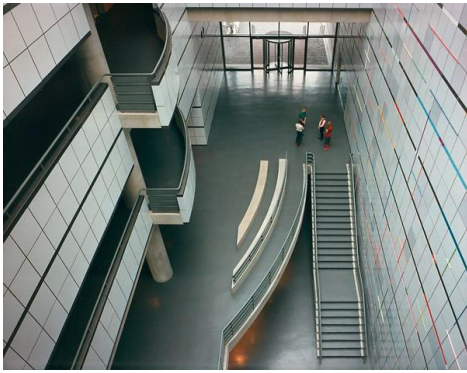
Leader in all major global steel markets, including Automotive, Construction, Household appliances and Packaging, with **leading R&D and technology.**

A major producer of steel in the **EU, North and South America, Africa** and in the **CIS region**, and a growing presence in Asia, namely in **China** and **India**.

One of the world's largest producers of iron ore strategically positioned to serve our network of steel plants and the external global market.



Leading steel and mining company, present in more than 60 countries



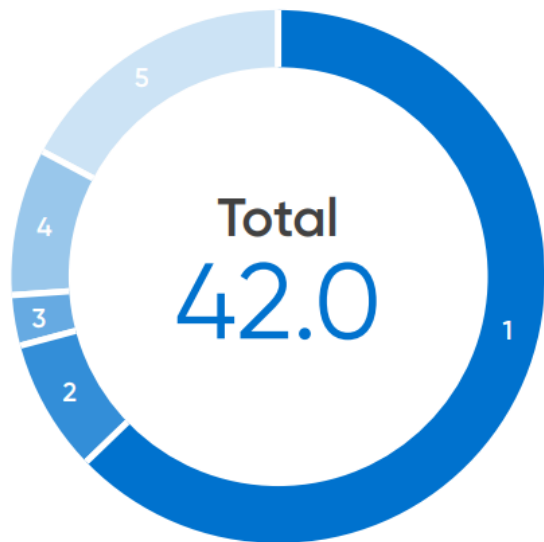


**“Not everything in the world is made of steel,
but nearly everything in the world is made with machines made of steel.”**

Ed Conway, “Material World”

Mining operations

Own iron ore production by region (Millions of Mt)



Region	2023	%
1 North America	26.4	63%
2 South America	3.5	8%
3 Europe	1.2	3%
4 Africa	3.6	9%
5 Asia, CIS & Other	7.3	17%
Own production*	42.0	100%

ArcelorMittal's self-sufficiency through its mining operations in 2023 reached 74%

Iron ore shipments and production 2023 (Millions of Mt)

Mt	2023	AMMC	Liberia
Iron ore production	26.0	22.4	3.6
Iron ore shipments	26.4	22.7	3.7





Mining facilities

- Iron ore mine (reported in the mining segment)
- Iron ore mine (Joint Venture)
- Iron ore mines (reported within) North America, Brazil, Europe and Others

Decarbonizing steel demands higher quality ores





SERRA AZUL

PEÑA COLORADA

LIBERIA

PORT CARTIER

MONT WRIGHT

KITTY LARK

Our Global R&D in a nutshell



1700 researchers



\$299m spending



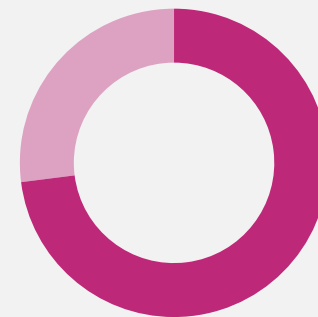
Comprehensive **portfolios**
100+ ongoing programmes



12 geographical sites



- Engineers (62%)
- Technicians (38%)



- Male (73%)
- Female (27%)

Over 30 nationalities, mixed generations:
working together in result-driven projects




How is our R&D

REIMAGINING tailings?



ArcelorMittal



- From RISK to ROBUSTNESS
 - From RESIDUE to RESOURCE
 - From LIABILITY to LEGACY
- 

From RISK to ROBUSTNESS



Evolving what & how we measure

Developing / Scouting + Adapting + Adopting all types of technologies that can provide valuable information about our tailings and TSFs

- **AMICOS** – Autonomous Monitoring and Control System for Mining Plants
- **SEC4TD** – Securing Tailings Dam Infrastructure with Innovative Monitoring
- **P1217** – Evaluation of Tailings Storage Facilities Monitoring Technologies



Evolving what & how we measure

Going one step further: predicting behaviour, partnering with top researchers worldwide working on liquefaction susceptibility of tailings

- **P1288** – Preventing Tailings Dam Failures: predicting liquefaction risk at different ages and states.
- **GeoLab Project** – Involving different EU universities to improve liquefaction modelling.



Supporting our mining operations

Very strong technical support for **dewatering**, **transport** and **disposal** of our tailings' streams.

- **Tailings Management Labs** in Spain, where we receive tailings samples and perform all needed testwork to support our sites.
- Full synergy with our **Mineral Processing Labs** in France, that design and optimize our beneficiation processes.

Working together with our mining teams, CTO, PMO, engineering companies and other key stakeholders. **Key to access mine info & data.**



Breakthrough research to increase ROBUSTNESS

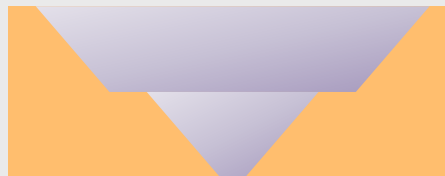
Now
pores in tailings



Future
cementing additives



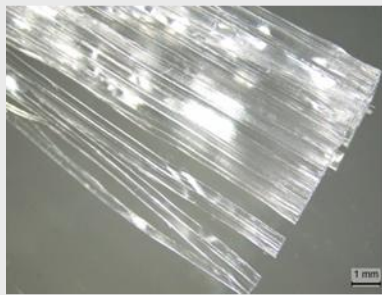
Now
conventional disposal



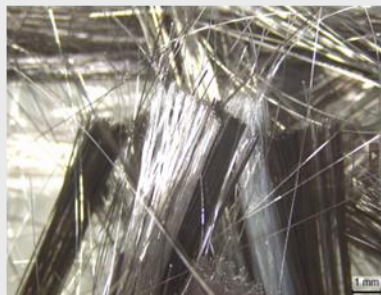
Future
rock-like



R&D of technologies that improve stability of our TSFs



Polypropylene



Nylon



Steel



From RESIDUE to RESOURCE



Tailings as iron ore source

- Some of our tailings' streams still contain **relevant concentrations** of iron ore
- **Mineral processing** technologies and equipment continue evolving



Contents lists available at [ScienceDirect](#)

Minerals Engineering

journal homepage: www.elsevier.com/locate/mineng

Evaluation of the Crago flotation process to recover the iron contained in the fine tailings of Mont-Wright mine

J. Mesquita ^{a,b,*}, Y. Foucaud ^{c,*}, H. Turrer ^a, M. Badawi ^b

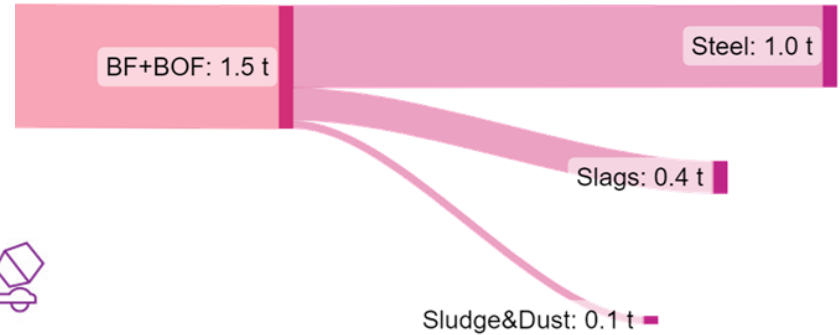
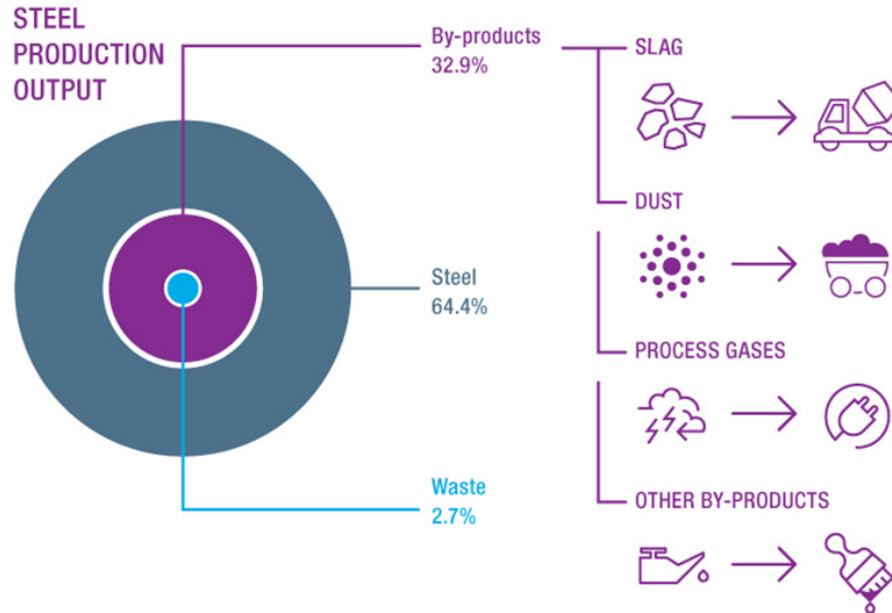
^a ArcelorMittal Global R&D, Maizières-les-Metz, France

^b Université de Lorraine, CNRS, Laboratoire Lorrain de Chimie Moléculaire, F-57000 Metz, France

^c GeoResources, Université de Lorraine, CNRS, F-54000 Nancy, France

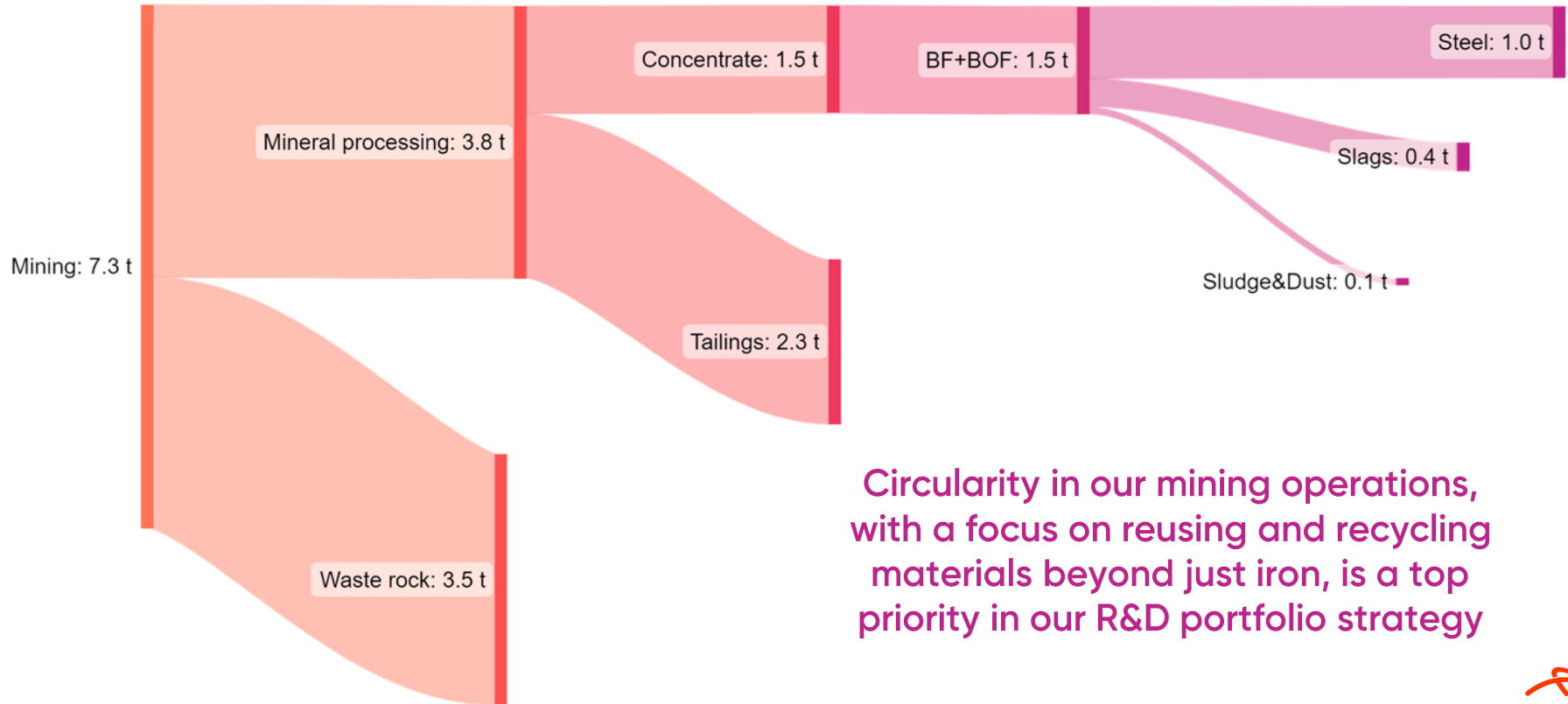
- Understanding, characterizing and monitoring **tailings composition** is key
- **Geometallurgy R&D program** plays a very important role in **predicting** all our outputs

Circularity requires understanding the big picture



In 2023 cement industry reused 9 Mt of our slags, avoiding 7 Mt of CO₂.

Circularity requires understanding the big picture

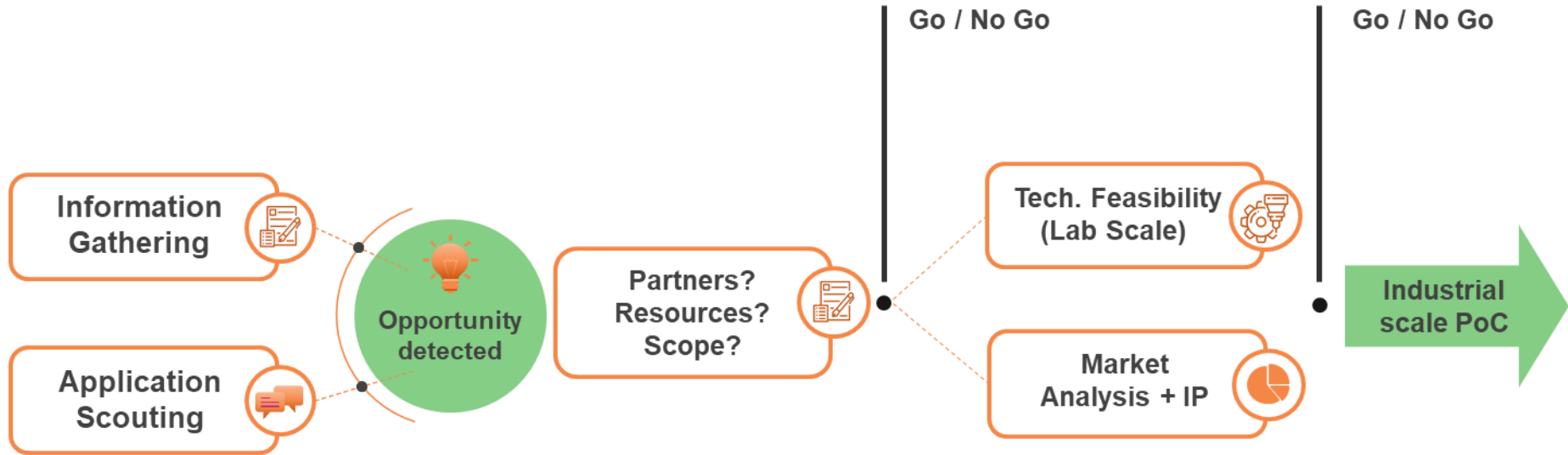


Circularity in our mining operations, with a focus on reusing and recycling materials beyond just iron, is a top priority in our R&D portfolio strategy

Circular mining: from construction materials to industrial applications



Circular mining R&D strategy



From LIABILITY to LEGACY



ArcelorMittal



Regenerating soils through circularity

Pioneering R&D project in our company to create a regenerative technosol using **tailings**.

- Involving **Andrade** and **Serra Azul** mines, as well as our **BioForest** for biochar in Brazil.
- 3yr project led by ArcelorMittal R&D Brazil and technically supported by **Universidade Federal de Viçosa**, in Minas Gerais.
- Using organic waste, tailings, and waste rock to **create fertile soil** capable of supporting **local biodiversity** for **degraded areas**.



UFV
Universidade Federal
de Viçosa

REIMAGINING tailings:

- From RISK to ROBUSTNESS
- From RESIDUE to RESOURCE
- From LIABILITY to LEGACY



ArcelorMittal



Mining CTO Team



Michael Rees

Global Manager
Tailings Management



Malcolm Shang

Global Head Mine Closure
and Circular Economy

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