

# Global R&D Spain



Global Research and Development

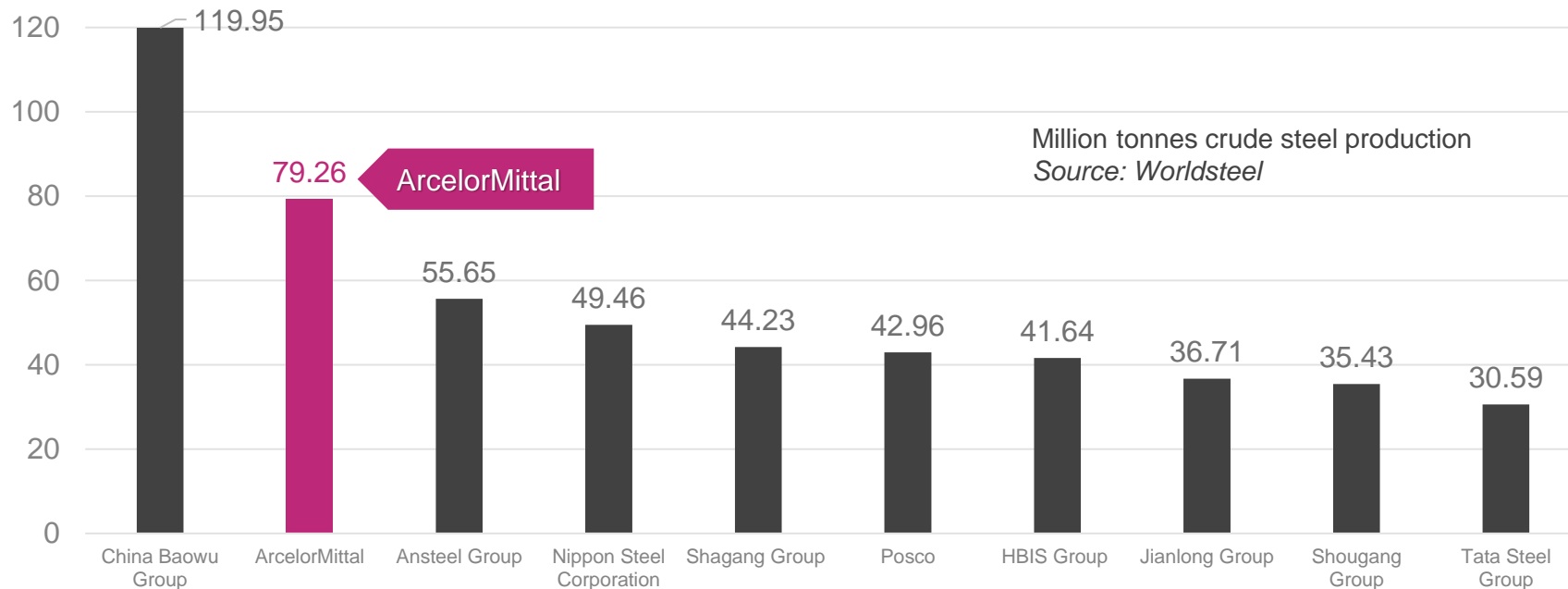
$$\frac{\partial f_{i,j}(\vec{x}, \vec{c})}{\partial x_i} = \sum_{k \neq i} c_{k,j}$$

R&D  
STEEL

A hand holding a grey marker is shown writing the word 'STEEL' in large, bold, black capital letters on a whiteboard. Above the word, the letters 'R&D' are written in red. The whiteboard is part of a larger graphic that includes a curved white surface and a colorful gradient background on the left side.

# ArcelorMittal Introduction

# Top steel producers 2021



# ArcelorMittal key figures

ArcelorMittal	2018	2019	2020	2021	2022
<b>Sales (USDm)</b>	76,033	70,615	53,270	76,571	<b>79,844</b>
<b>Ebitda (USDm)</b>	10,265	5,195	4,301	19,404	<b>14,161</b>
<b>Operating income / (loss) (USDm)</b>	6,539	(627)	2,110	16,976	<b>10,272</b>
<b>Net income / (loss) (USDm)</b>	5,149	2,454	(733)	14,956	<b>9,302</b>
<b>Steel shipments (million tonnes)</b>	83.9	84.5	69.1	62.9	<b>55.9</b>
<b>Crude steel production (million tonnes)</b>	92.5	89.8	71.5	69.1	<b>59.0</b>
<b>Own iron ore production* (million tonnes)</b>	58.5	57.1	58.0	50.9	<b>28.6**</b>

\* Own iron ore and coal production excluding strategic long-term contracts

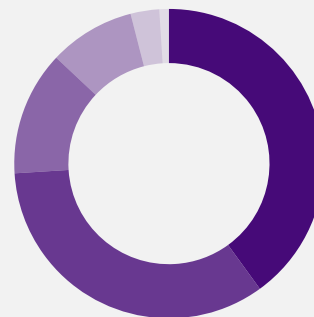
\*\* Canada and Liberia only

\*\*\* Metal processing, machinery, electrical equipment and domestic appliances

\*\*\*\* Mining, chemicals and water, slag, waste, sale of energy and shipping

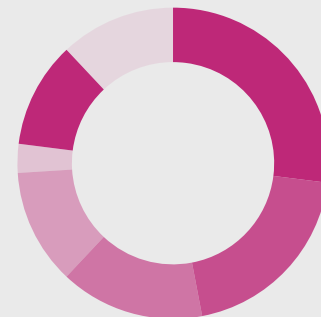
Source: <https://corporate.arcelormittal.com/media/o4h3wdy/4q22-earnings-release-final.pdf>

## Employees by region (2022)



- Europe (40%)
- ACIS (34%)
- Brazil (13%)
- NAFTA (9%)
- Mining (3%)
- Others (1%)

## Sales by market (2022)



- Distribution (27%)
- Construction (20%)
- Automotive (15%)
- Primary transformation (12%)
- Packaging (3%)
- Other steel sales\*\*\* (11%)
- Other sales\*\*\*\* (12%)

# Sustainable leadership

## We are leading the industry in providing low-carbon solutions to our customers

- Texas HBI plant acquired, securing high-quality metallics for low-carbon steelmaking
- 1<sup>st</sup> smart carbon CCU project inaugurated in Ghent (Belgium)
- 4 specialist scrap metal recyclers acquired in Europe
- 1<sup>st</sup> low-carbon emissions steelmaking project in Dofasco (Canada)
- Company is progressing on key European decarbonization projects
- \$0.6bn investment in 1GW renewable energy project in India underway

**Group target:  
25% reduction in  
carbon emissions  
intensity by 2030**

# Global Research and Development

# Global Research and Development

## 2022 key figures



**1600** researchers



**\$286m** spending

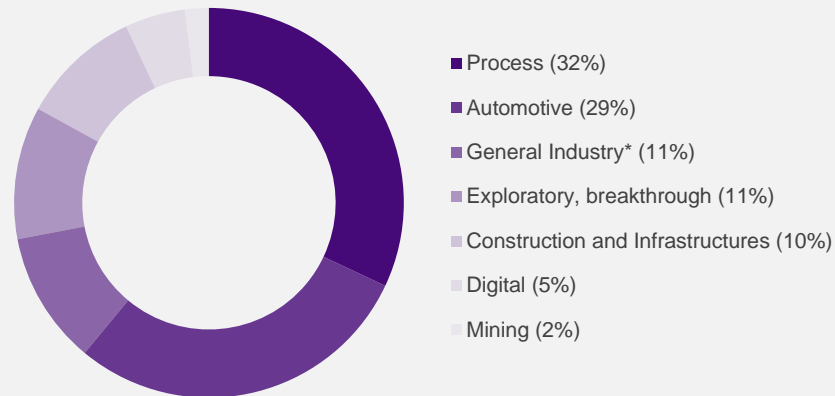


Comprehensive **portfolios**  
**100+** ongoing programmes



**14** geographical sites

## R&D spending



\* General Industry: Packaging, Appliance, Metal Processing, Energy, Machinery

# Global Research and Development

## Other 2022 key figures

41

new products and  
solutions launched



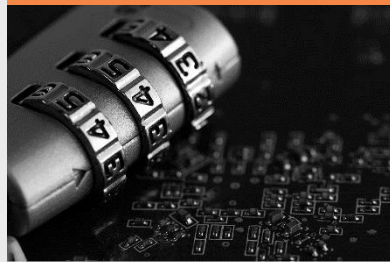
79

new inventions  
protected



770

active patent  
families



12000

patents and  
patent applications





# Global Research and Development

## Where we are

Presence in 9 countries,  
14 geographical sites,  
including:

- Research centres
- R&D units
- Product and Process deployment centres



# Global Research and Development

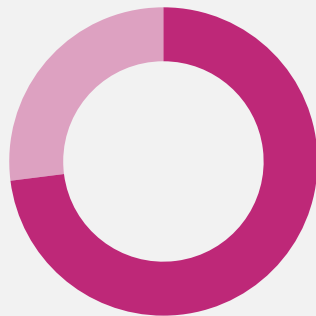
## Highly talented people



**1600** researchers



■ Engineers (62%)  
■ Technicians (38%)



■ Male (73%)  
■ Female (27%)



Over 25 nationalities, mixed generations



Working together in result-driven projects



Extensive international experience



Graduates from the best universities and engineering schools worldwide

# Global Research and Development

## Meeting our customers' needs



# Global Research and Development

## Products portfolio overview

### Answering to the need of our customers on their markets:

- Automotive/Mobility
- Construction and Infrastructure
- Energy
- Packaging
- Yellow and Green goods
- Specialty plates

### Our developments:

New Products

Generic Solutions

Customer Support

Knowledge Building



# Global Research and Development

## Process portfolio overview

### Answering to the need of our operations:

- Steel upstream operations:
  - Cokemaking, agglomeration, ironmaking and steelmaking
- Steel downstream operations:
  - Rolling, annealing, coatings and surface treatment
- Product quality:
  - Systems and defectology
- Transversal issues:
  - Measurements, decarbonisation, environment, by-products, energy and optimisation

### Our developments:

New Technologies

Standard Solutions

Technical Assistance

Knowledge Building



# Global Research and Development

## Mining portfolio overview

### Answering to the need of our mining operations:

- Mineral Processing:
  - Cost reduction
  - Improvement of yield and product quality
  - Development of new products
- Digital solutions:
  - Optimising mass and metallurgical recoveries
  - Reducing downtime
  - Securing Health and Safety
- Tailings Management:
  - Mine closure
  - Tailings Monitoring
  - Tailings Disposal

### Our developments:

New Technologies

Standard Solutions

Technical Assistance

Knowledge Building



# Global Research and Development

## Digital portfolio overview

Answering to the need of our operations, business functions and R&D itself:

- Global Digital Platforms:
  - Big Data
  - Industrial Internet of Things
  - Collaborative Digital Product Development
- Digital Manufacturing:
  - Predictive Quality
  - Predictive Maintenance
  - Productivity/Throughput
- Digital Business:
  - Supply Chain
  - Commercial
  - Purchasing
  - Inventories
  - Strategy/Investments

Our developments:

Differentiating Algorithms

Techno-economic Models

Standard Solutions

Knowledge Building



# Global Research and Development Leadership Team



**Greg Ludkovsky**  
Vice President Global R&D



**Susana Peregrina**  
Executive Assistant



**Pedro Prendes**  
Process Portfolio



**Carlos Alba**  
Digital Portfolio



**Nicolás de Abajo**  
Research Centres,  
Operational Performance



**Jean-Luc Thirion**  
Flat Products Portfolio, Sustainability



**Filipe Vasconcelos**  
Mining Portfolio



**Thinus Van den Berg**  
Finance, Information Systems,  
EU Affairs, Purchasing



**Nicoleta Popa**  
Steligenca®, Construction Applications,  
Infrastructures, Long Products Portfolios



**Sylvie Gindre**  
Communication



**Véronique Lenglin-Smagghe**  
Human Resources, Intellectual Property



# Our commitment to sustainability

# ArcelorMittal

## 10 sustainable development outcomes

### The company we need to become

#### Safety

Wherever we operate, safety and wellbeing is the priority. Safe, healthy, quality working lives for all people is what we want

#### Product innovation

We push steel's capabilities, so it has a role in a low carbon, circular economy. Product innovation enables sustainable products and infrastructure

#### Environment

Our impact on the environment means careful management of our resources is critical – throughout the value chain and our use of air, land and water

#### Climate change

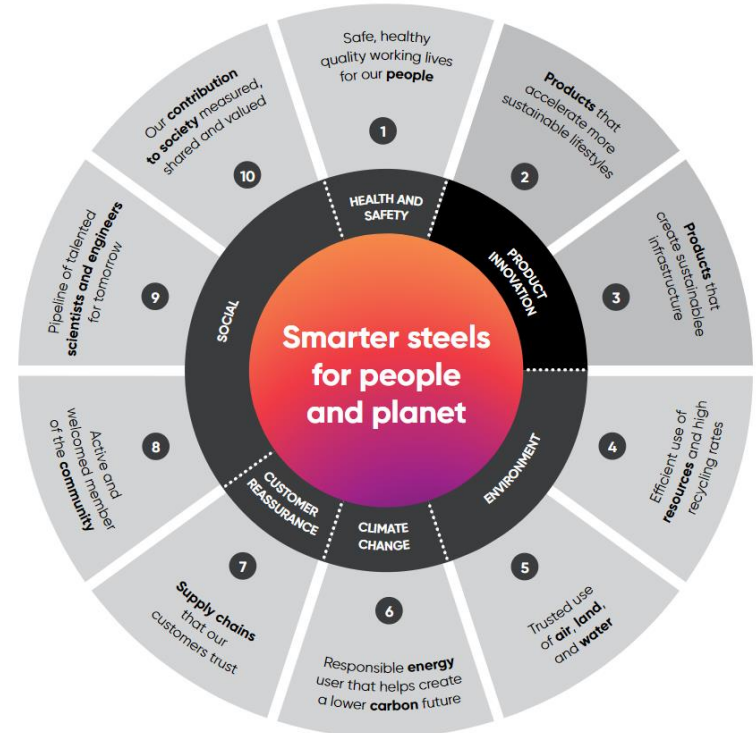
We have a responsibility to be at the forefront of a transition in steel to help create a lower carbon future

#### Customer reassurance

We are developing a 'mine to metal' assurance chain so our customers can work with a supply chain they can trust

#### Social

We need to have good relations with the communities we work in, protect human rights and attract and retain talent



# Global Research and Development

## Sustainability assessment

The Global R&D team is dedicated to the sustainability assessment of **ArcelorMittal products and processes** for all sectors (e.g., Automotive, Construction, Packaging and General Industry)



### Environmental footprint of steel products and processes:

- New R&D Product/Process
- Support to address clients' enquiries
- Sustainable innovation tool

### General Research Projects:

- Methodological research e.g., new indicators, social aspects
- Environmental profiles of competitive materials
- Network and conferences (annual Society and Materials – SAM seminar)

### Expertise and technical support:

- Customer requests e.g., presentations, product footprint
- Expert in working groups for standard developments and international bodies

# Global Research and Development Sustainability key achievements

- Around **200** Life Cycle Assessments (LCAs) studies evaluating ArcelorMittal products and processes (**62** LCAs in 2022)
- Company specific Environmental Product Declarations according to worldwide standards and certifications related to construction (**40** EPDs published to date)
- Development of ad hoc tools for business units to assess specific projects environmental footprint
- Over **400** ArcelorMittal employees trained to life cycle methodology



# Global R&D Spain

# Global R&D Spain – Organization & People



**Charles de Abreu Martins**  
CEO Global R&D Spain



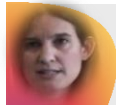
**Francisco Lago**  
Director – Decarbonization & Sustainability



**Ramón Laso**  
COO/ CFO Global R&D Spain



**José Arancón**  
Director – Process & Product Technologies



**Tatiana Manso**  
CDO Global R&D Spain



**Tatiana Manso**  
Director – Digitalization



**Noemí Torrado**  
Director – Shared Services

# Global R&D Spain



Global Research and Development

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R&D  
STEEL

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