

# H<sub>2</sub> for Bremen's Industrial Transformation



ArcelorMittal

## The journey to green steel

HY5 Webinar - GTAI  
2022, October 7<sup>th</sup>

Jürgen Fries  
CO<sub>2</sub>-Strategy  
ArcelorMittal Bremen





is a **steel & mining company**  
gathering **158,000 employees** with steelmaking operations\* in **16 countries** on **4 continents**

*\* Integrated facility or mini mill*



# ArcelorMittal Europe – Facts and Figures

**400** locations

Ebitda (US \$ billion) **6,7**

**61.000** employees

**37 Mio. t** crude steel

Industrial presence in

**9** countries



# ArcelorMittal Germany

Bremen



Duisburg



Eisenhüttenstadt



Hamburg



- 4 production sites
- Flat products: Bremen and Eisenhüttenstadt
- Long products: Hamburg and Duisburg
- 13 Distribution and Steel Service Centres

	2021
Health and Safety (LTIFR*)	0,46
Crude steel production	7,1 Mt
Turnover	€ 8 Bn
Employees	8.500
Trainees	>500

\* LTIFR = Lost Time Injury Frequency Rate)

# ArcelorMittal Bremen – Facts and Figures

**< 1%** frequency of accidents

**3,2 Mio. t** annual capacity

**3,100** employees

**approx. 200** apprentices

**7 km<sup>2</sup>** premises



# Production Lines



Hot Rolling Mill

Cold Rolling Mill

Bregal 1

Steel plant

Bregal 2

Tailored Blanks

Blast furnace 3

Blast furnace 2

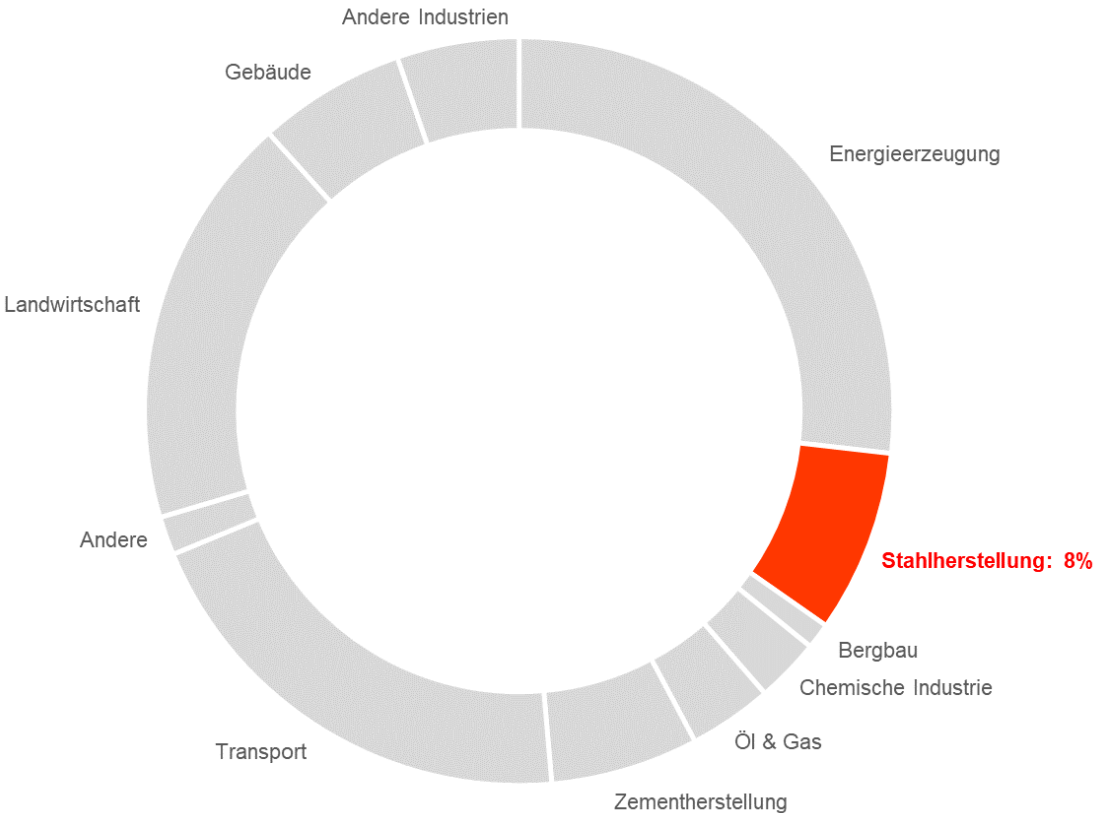
Sintering Plant

Port – Terminal 3

Coking Plant in Bottrop

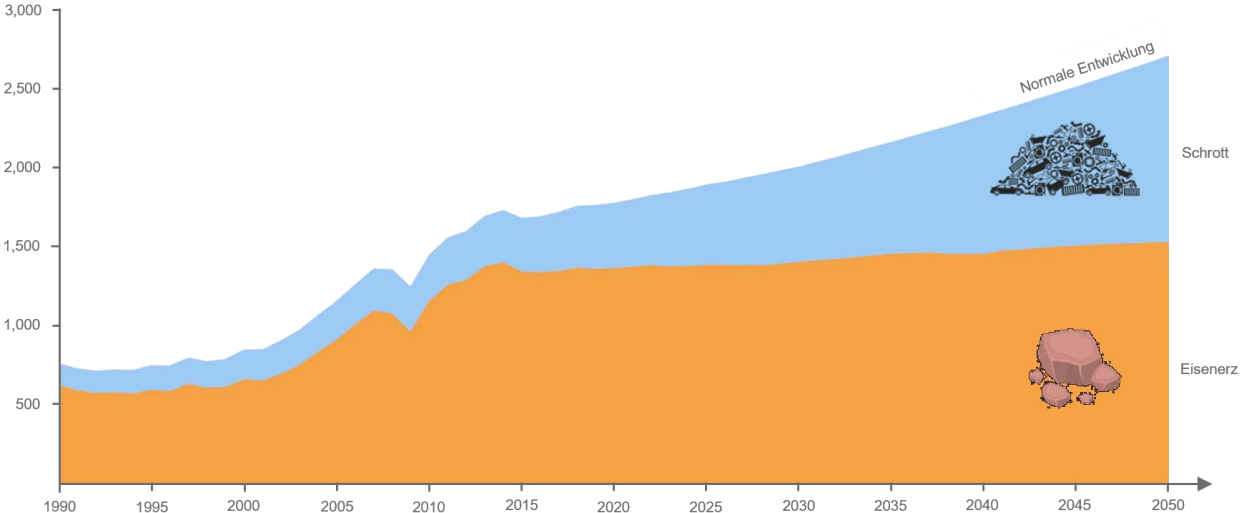
# Our Challenge

Amount of global CO<sub>2</sub> emissions



Source: McKinsey & Company, 2020

Evolution Outlook Steel demand



Source: ArcelorMittal, 2019

- In Europe, steel mills that produce steel by means of blast furnaces and BOF emit an average of 2.112 tonnes of CO<sub>2</sub> per tonne of steel produced in accordance with the EU Emissions Trading Scheme.

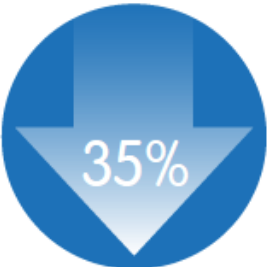
# Our Commitment: A climate neutral Steel production

## Leading the industry

- New Group target of a 25% reduction in CO<sub>2</sub>e emissions intensity by 2030 (scope 1 and 2)

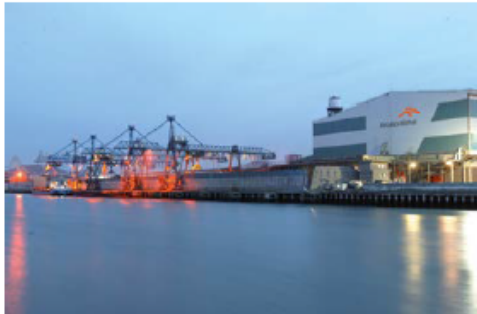


- Europe target increased to 35% reduction in CO<sub>2</sub>e emissions intensity by 2030 (scope 1 and 2)



## World's first zero carbon-emissions steel plant

- World's first full-scale zero carbon-emissions steel plant in Sestao, Spain, by 2025



- Plans for further steelmaking transformation in Europe and NAFTA

## First to market

- Customer appetite for low-carbon steel is real, as demonstrated by demand for our XCarb™ product

**XCarb™**  
Towards carbon neutral steel

- Competitive advantage with greater volumes, capturing commercial opportunities

## Funding

- \$10 billion total investment required to achieve 2030 Group decarbonisation target
- Securing public funding support is a key focus and an opportunity to accelerate
- ArcelorMittal's expectation is that public funding covers 50% of the total cost of decarbonisation (capex and higher opex) so that companies are not rendered uncompetitive during the transition period



# Our strategic and operational plan for the transition to carbon neutrality



2030

## Clear path to achieving a 35 percent CO<sub>2</sub> reduction

### 1. Proven technologies

- Use of more scrap in the converter
- Replacement of coal in the blast furnace by injection of hydrogen-rich gases

### 2. Increase of scrap

- Further increase of the scrap content in the converter using new melting processes

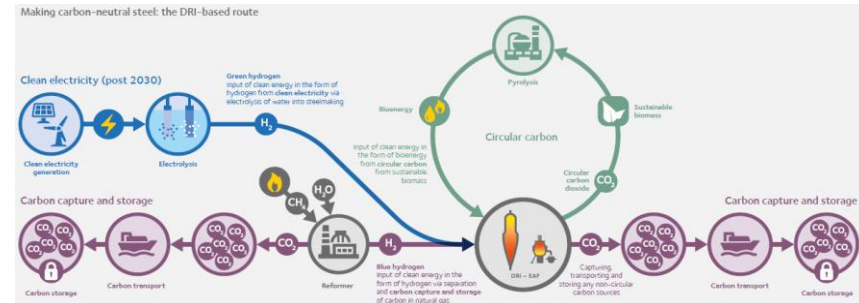
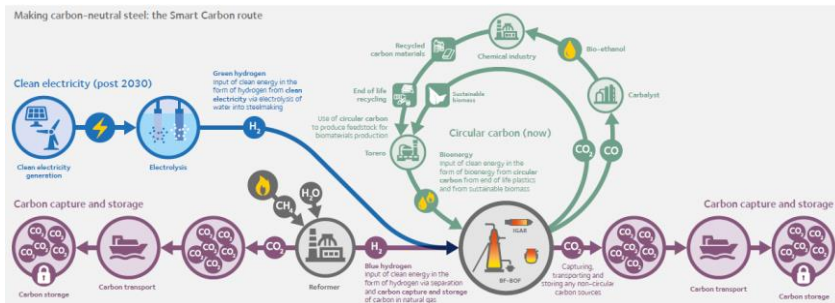
### 3. Smart Carbon

- Investments in projects to test new decarbonisation technologies on an industrial scale

2050

## Full introduction of smart carbon and innovative direct reduction technologies to achieve climate-neutral steel production

In each of these ways, we actively test technologies and develop a broad portfolio of breakthrough processes for low-carbon steel production. Some of these new technologies could reach market maturity before 2025, and by 2030 many will be mature and partially implemented in our facilities in Europe.



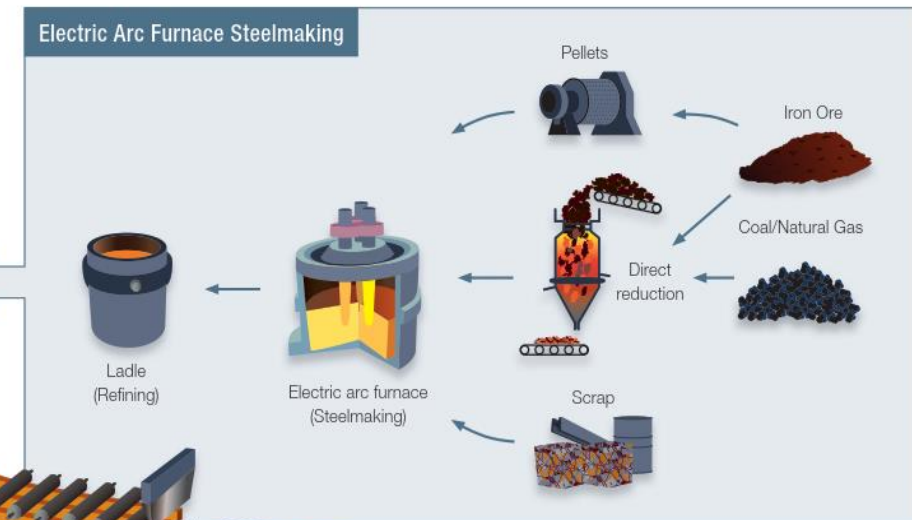
# CO<sub>2</sub> neutrality through direct reduction: substitution of carbon by hydrogen

Objective: Conversion of oxide iron ore into metallic iron

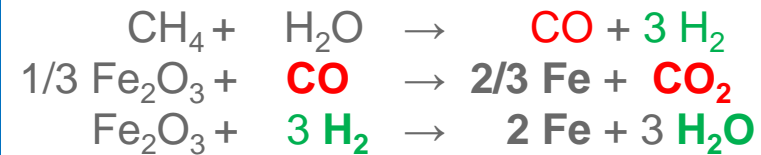
## BF-BOF-Route



## DRI-EAF-Route



Bildquelle: worldsteel.org

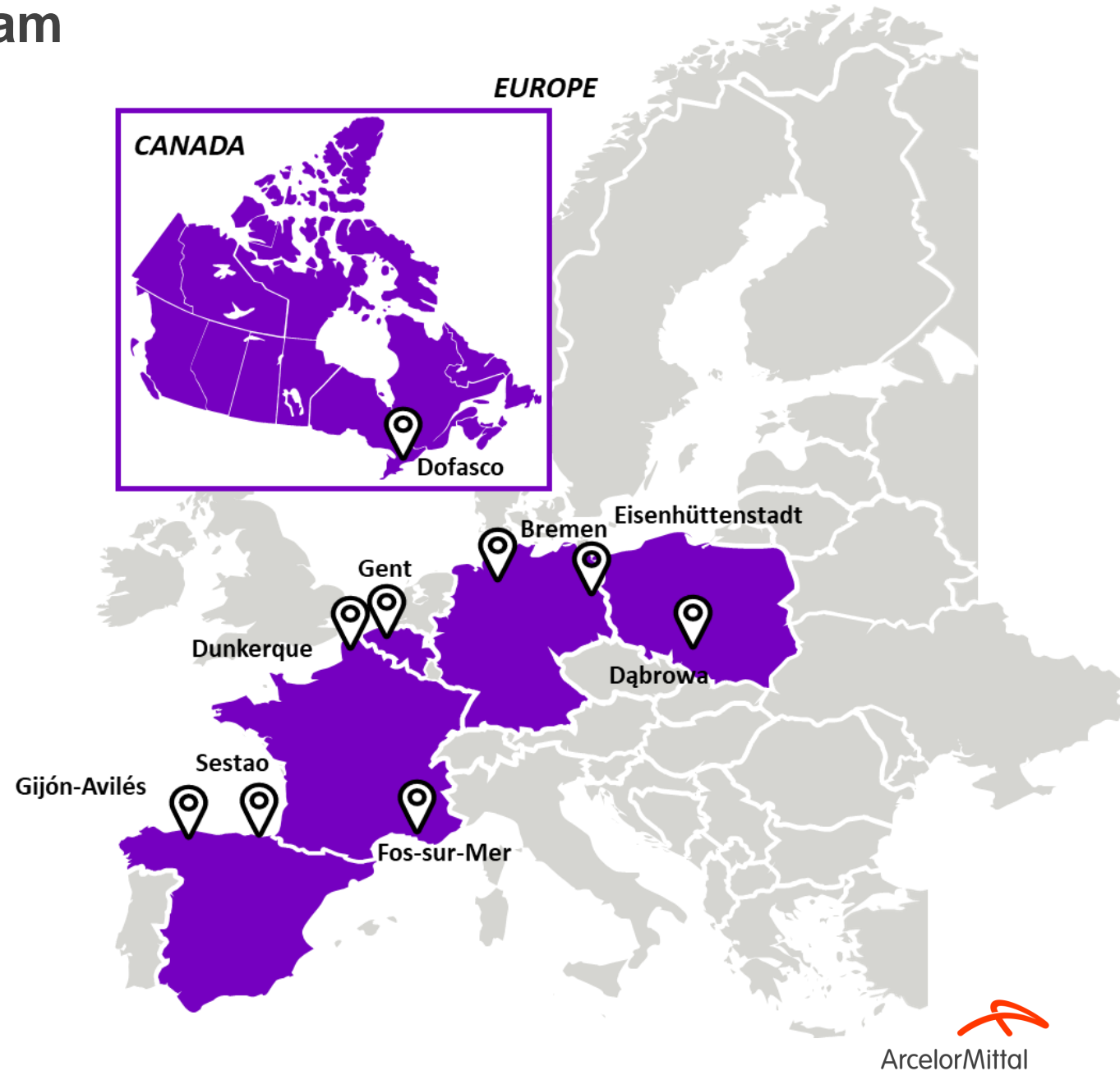


ODER



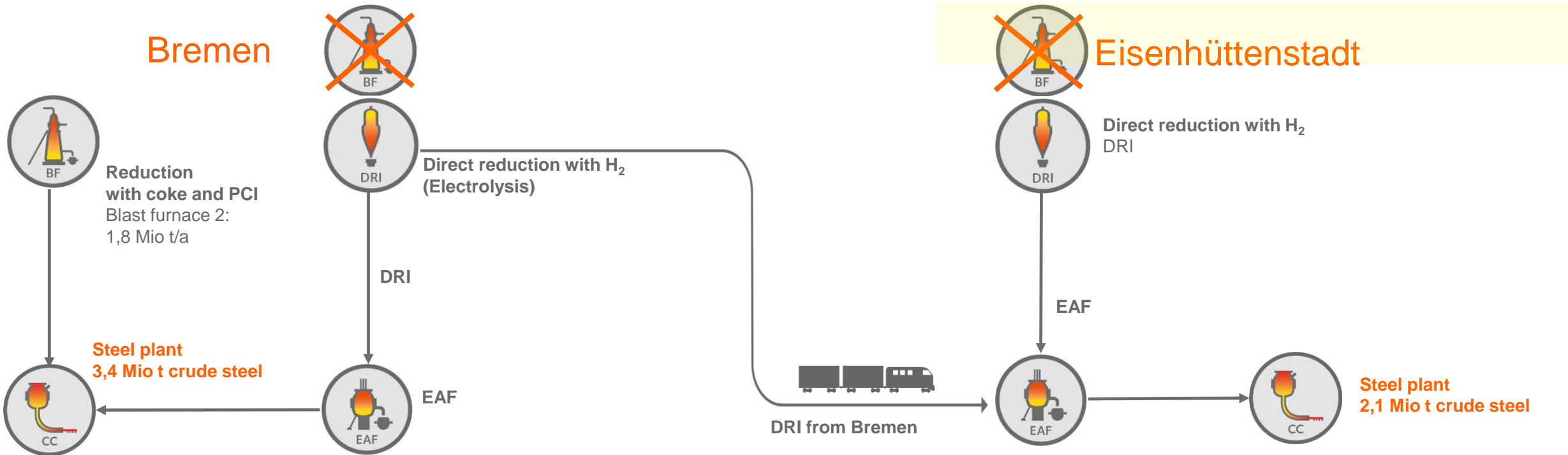
# ArcelorMittal decarbonisation program

- ArcelorMittal will build several DRI and EAF plants in Gijón, Bremen, Eisenhüttenstadt, Dunkerque, Ghent, Dąbrowa Górnicza, Fos-sur-Mer and Dofasco Canada.
- The goal of commissioning new EAFs and DRI plants within a short period of time represents a very major challenge, but also a unique opportunity for the future orientation towards climate-neutral steel production.



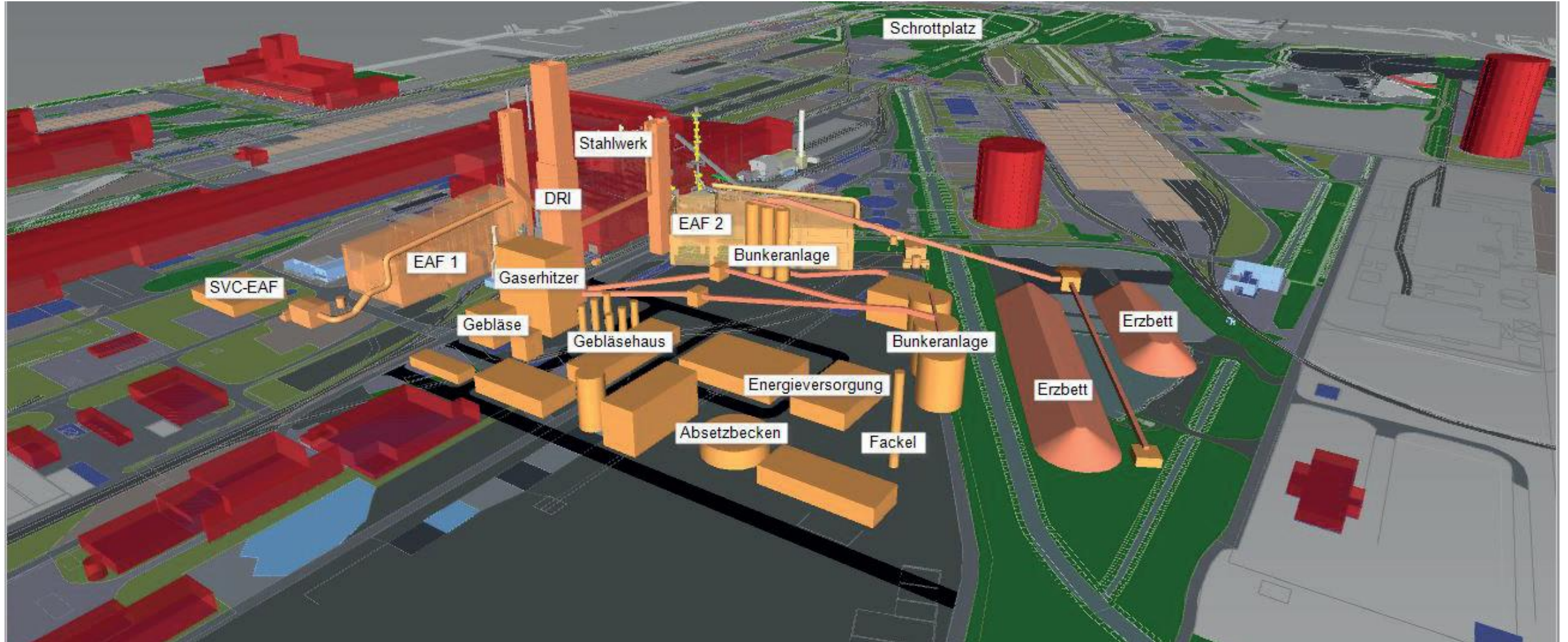
# CO<sub>2</sub> strategic concept for the sites in Bremen and Eisenhüttenstadt 2030

## The path towards Green Steel



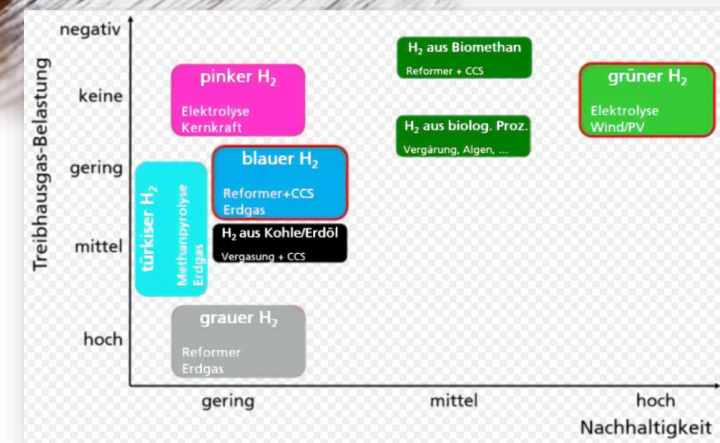
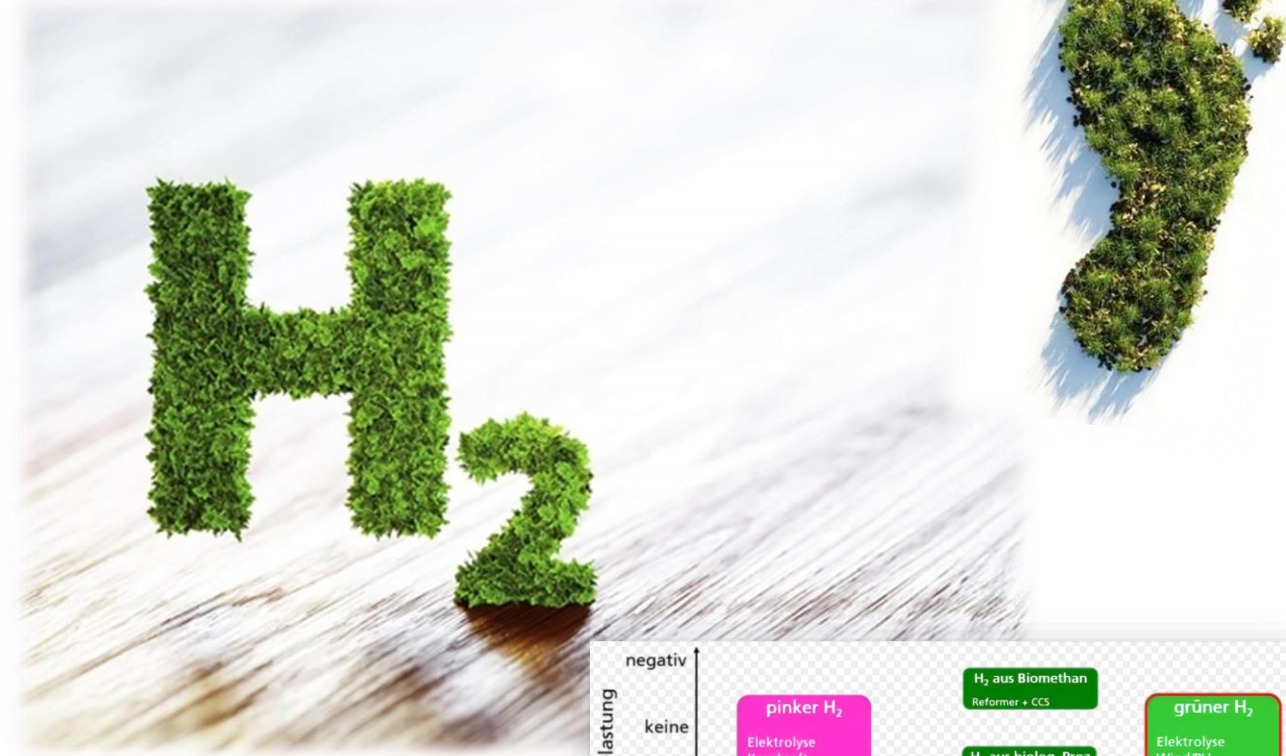
**DRI/EAF: 3,5Mt with avg. CO<sub>2</sub> reduction of 93%**  
**Total vol.: 5,5Mt with avg. CO<sub>2</sub> reduction of 58%**

# ArcelorMittal Bremen – The future Layout



# Transformation in Bremen: Modification with natural gas and H<sub>2</sub> later on

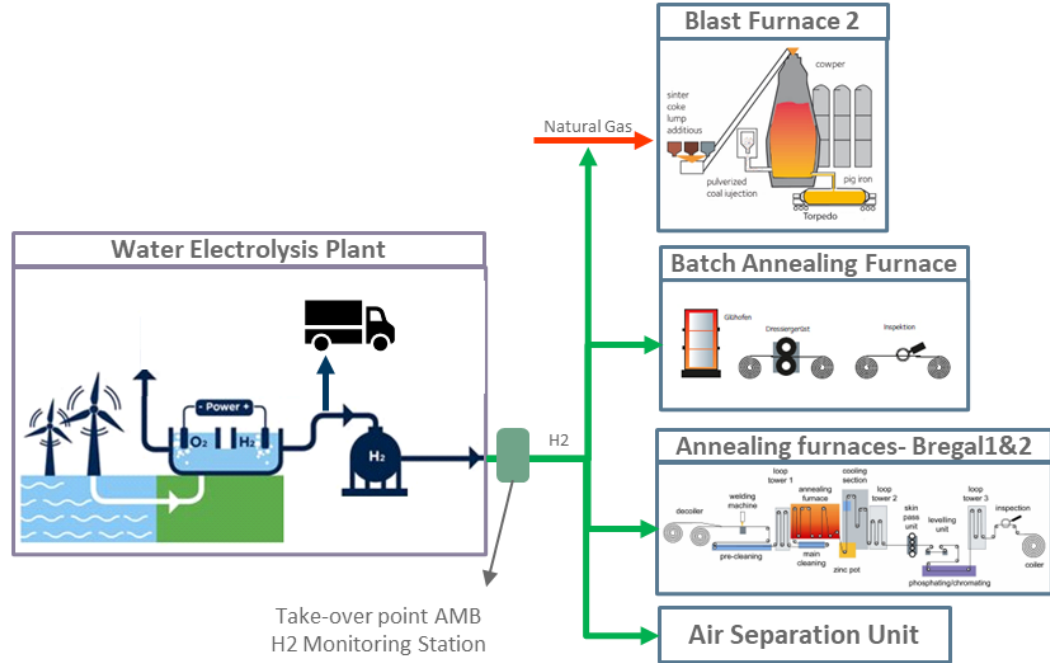
- **First step in 2021:** Modification of the BFs in Bremen and Eisenhüttenstadt for **NG injection**, to switch later on to **Hydrogen**
- **10MW Hydrogen** electrolyser starting up in **2024** next to the future DRI plant
- **Until 2026** erection of DRI plants and EAFs to substitute one blast furnace in each site
- Use of natural gas in the transition period
- Use of **hydrogen** when volumes available and economically reasonable
- **Cooperation** with technology partner
- Setup and expansion of a national **hydrogen infrastructure**



# HyBit „Hydrogen for Bremen’s industrial transformation“

## Green Hydrogen from 10 MW Water Electrolysis Plant

- **ArcelorMittal Bremen GmbH (AMB)** cooperates with the regional energy suppliers **swb AG & EWE GASSPEICHER GmbH** to build a water electrolysis plant with an electrical capacity of 10MW.
- AMB will use 8.33MW capacity of the plant. The remaining 1.67MW will be used by EWE for mobility purposes.
- The plant will produce the so-called **green hydrogen** (power supply from renewable energy sources).
- The demand of AMB's existing hydrogen consumers will be covered with **green hydrogen**. In addition, green hydrogen will be used, mixed with natural gas, at the tuyères of blast furnace 2.



The electrolysis plant will be built at the Mittelsbüren power plant site

### Support for the AMB decarbonization strategy

“The construction of the electrolysis plant marks the starting point for the use of green hydrogen in steel production in Bremen and will become an important building block in the decarbonization of steel production at ArcelorMittal Bremen.”

**Reiner Blaschek, CEO ArcelorMittal Germany**

### Key data

- Planned commissioning: Q3 2024
- Grant funding in the amount of **10 million euro** for the HyBit project (Bremen).
- **Scope of AMB:** distribution and use of green hydrogen.
- **Scope of EWE/swb:** build a water electrolysis plant.
- FID, June 2022: construction of an electrolysis plant was awarded to the APEX Group (Rostock/Laage)

# Link with infrastructure projects

An essential part of the hydrogen strategy in Europe and Northern Germany



- IPCEI
  - Green H<sub>2</sub>-production up to 400 MW
  - Infrastructure for transportation, storage and distribution
  - Key market: steel industry
- Forecast 2030:
  - Expansion of electrolysis capacity up to 1 GW until 2030 (potential > 1 GW)
  - Partner will expand storage capacities (> 200 GWh) until 2030 (potential > 1 TWh)
  - The pipeline of Gasunie and EWE enables the connection > 2 GW

EWE

swb

Tennet

ArcelorMittal

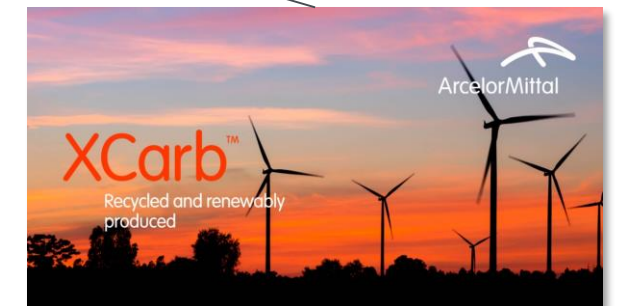


# XCarb<sup>®</sup> – the new umbrella brand of ArcelorMittal

The XCarb<sup>®</sup> umbrella brand brings together all **products, steel manufacturing activities, initiatives and green innovation projects** to reduce CO<sub>2</sub> emissions throughout the Group.

The XCarb<sup>®</sup> brand combines three initiatives:

- XCarb<sup>®</sup>- innovation fond
- XCarb<sup>®</sup>- Certificates for green steel
- XCarb<sup>®</sup>- recycelt and renewable



# Conclusion

---

- ArcelorMittal aims to reduce emissions by 35 percent in Europe by 2030 and to produce climate-neutral steel by 2050.
- The transformation effort is enormous and requires the fundamental conversion of primary steel production and cannot be implemented on its own.
- This requires the right political framework conditions such as:
  - Simplified funding programmes with a focus on decarbonisation
  - Accelerated approval procedures
  - Regulations to ensure fair competition on the world market (e.g. CCfD, CBAM)
  - Establishment of a market for green steel
- ArcelorMittal Germany contributes to securing the future of Germany as an industrial location with its technology conversion to green steel.

*Thank you for your attention*

---



ArcelorMittal

