

# SCRAP SUPPLEMENTS & ALTERNATIVE IRONMAKING 10



## Green Metallic Hubs & HBI Price Decoupling

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**11<sup>th</sup> March 2026**

**HATCH**

We will explore the following questions together

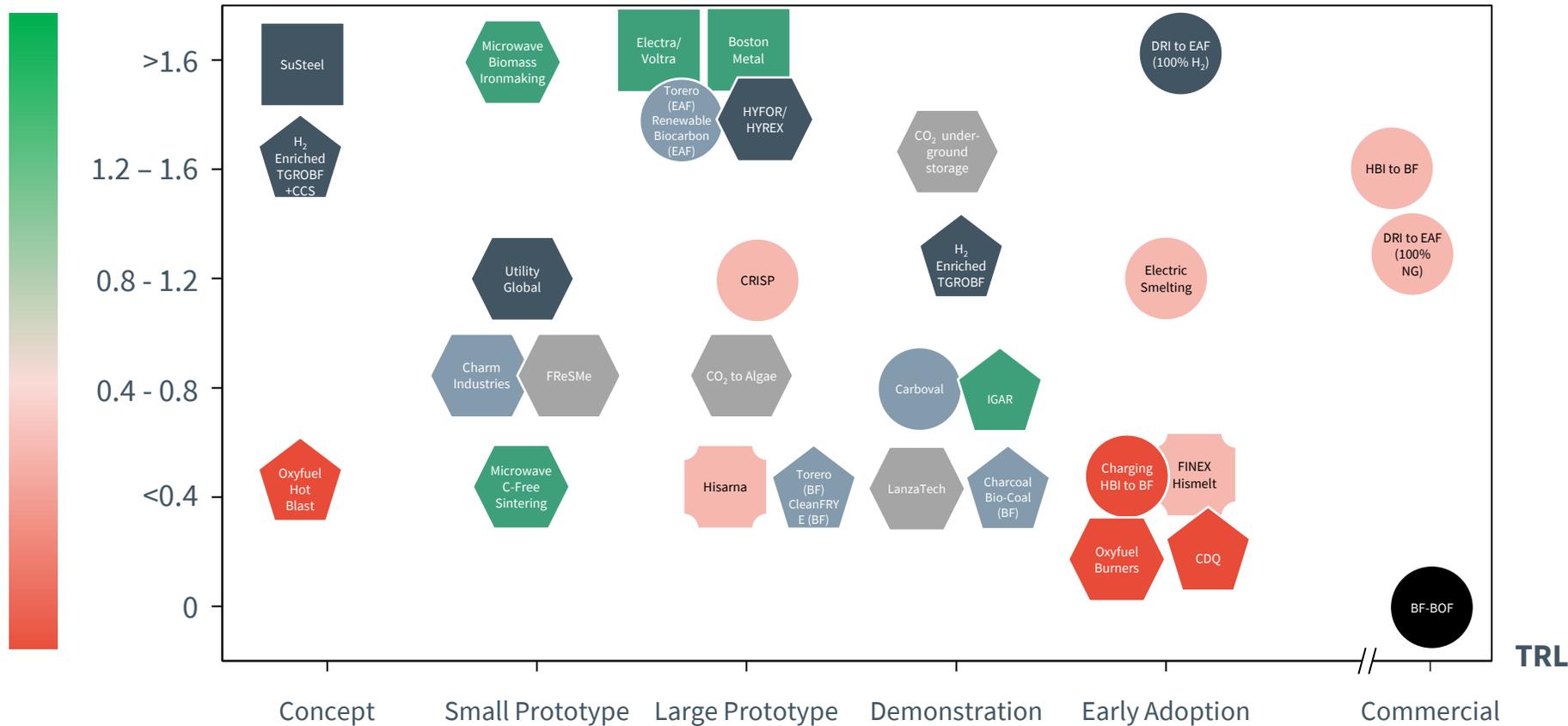
- 1** | **What will drive a fundamental change in the traded DRI/HBI market globally?**
- 2** | **What will be the changes in the pricing model of DRI/HBI ?**
- 3** | **What will the be differences in the pricing between different regions?**
- 4** | **How could the industry respond to the fundamental shift?**



# DRI-EAF is the only most technically mature option today to decarbonize the industry but requires a niche iron pellet feed

## Emission reduction potential across Technology Readiness Level (TRL)

### Emissions Reduction Potential (CO2/t)



- Most technologies are early in technology readiness level
- Hydrogen reduction and green power technology have highest potential for carbon reduction
- Each technology has a specific Fe content percentage and physical configuration requirement

### Raw Material Requirements

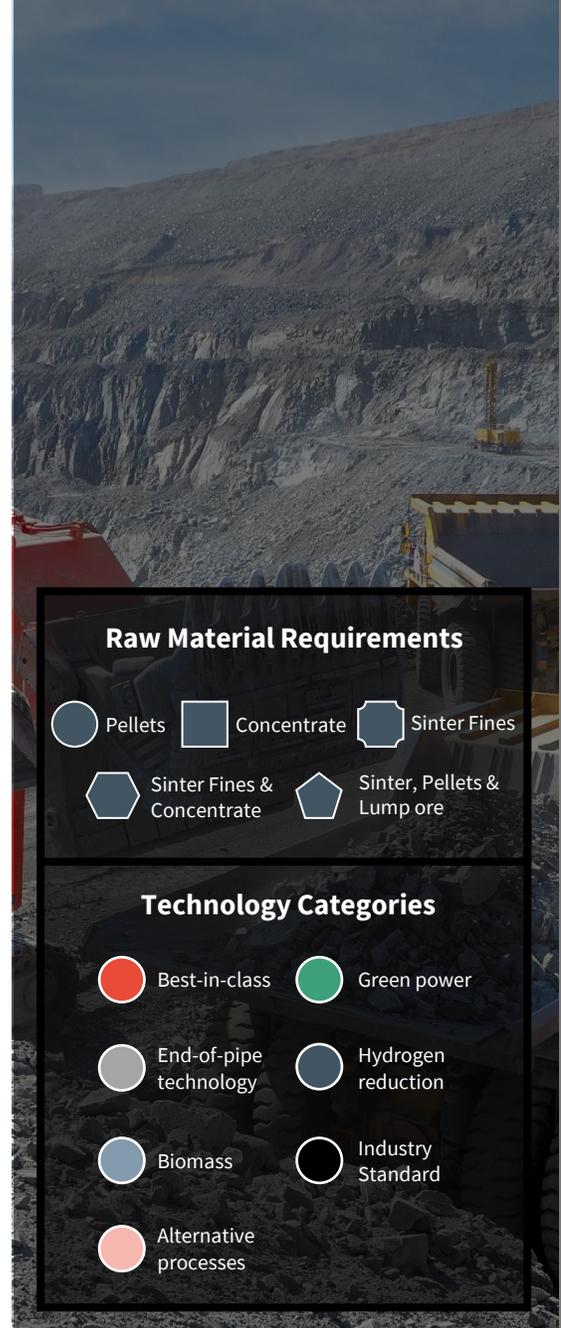
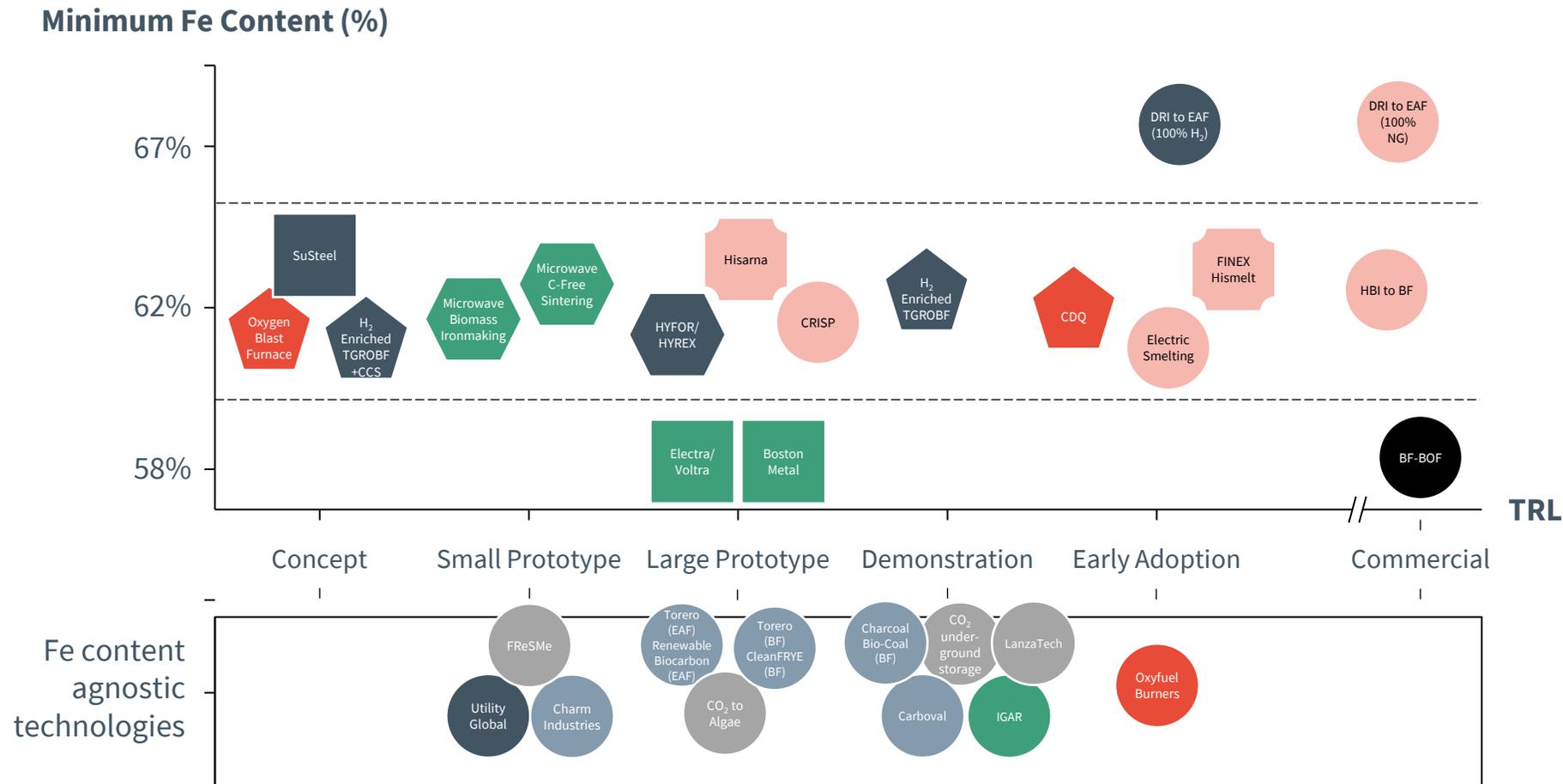


### Technology Categories



# Technologies which could use lower grade ore or grade agnostic are many years away from commercial deployment

## Iron ore Fe content across Technology Readiness Level (TRL)



**Raw Material Requirements**

- Pellets
- Concentrate
- Sinter Fines
- Sinter Fines & Concentrate
- Sinter, Pellets & Lump ore

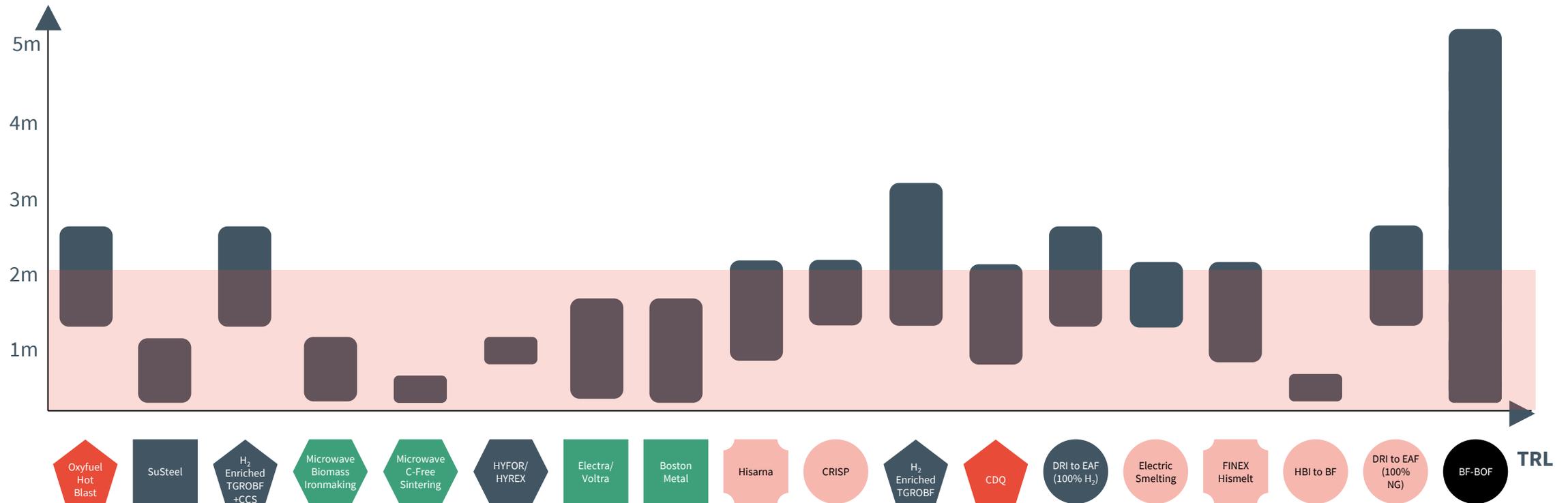
**Technology Categories**

- Best-in-class
- Green power
- End-of-pipe technology
- Hydrogen reduction
- Biomass
- Industry Standard
- Alternative processes

Many technologies are in the < 2.0 Mtpa range and are not a stage where they are comparable to a BF or even DRI module

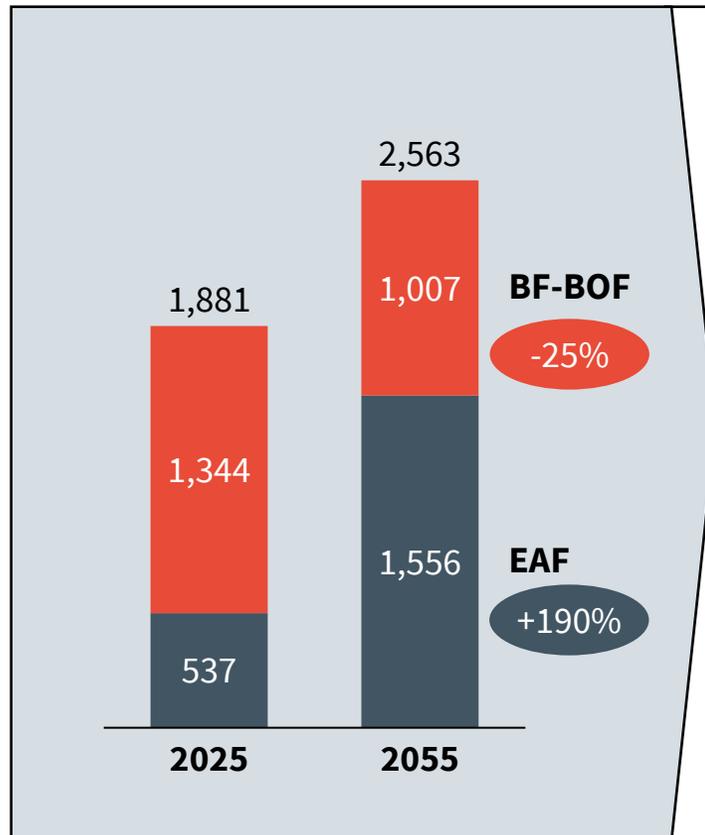
### Expected Unit Capacity across Technology Readiness Level (TRL)

Expected Unit Capacity (tpy)

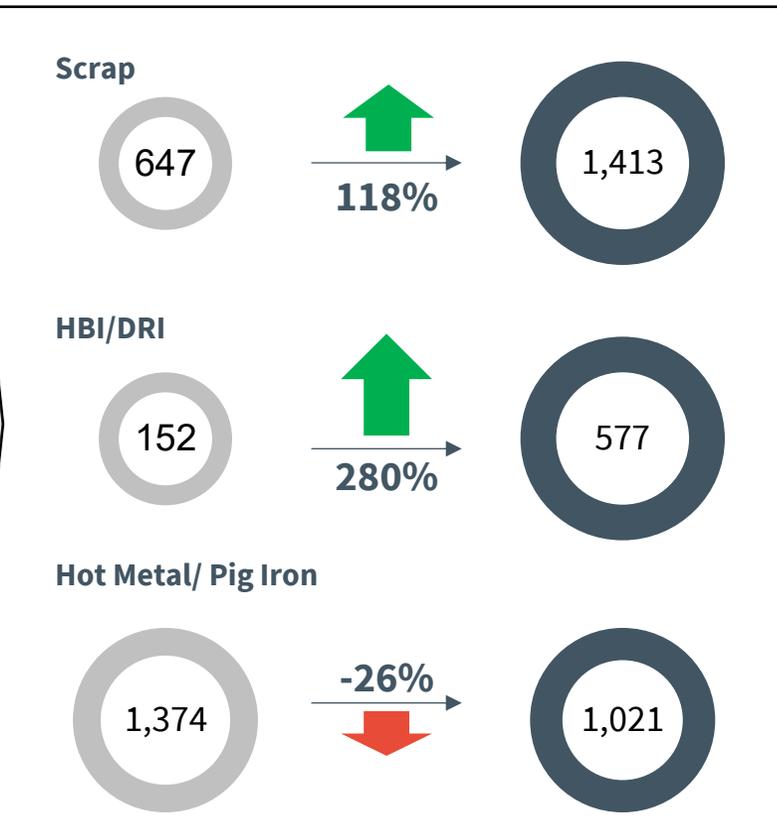


# Steelmaking is undergoing a structural shift as EAF growth reshapes metallics and outpaces scrap supply

**Crude steel production  
(million tonnes) 2025 - 2055**



**Raw material demand  
(million tonnes) 2025 - 2055**



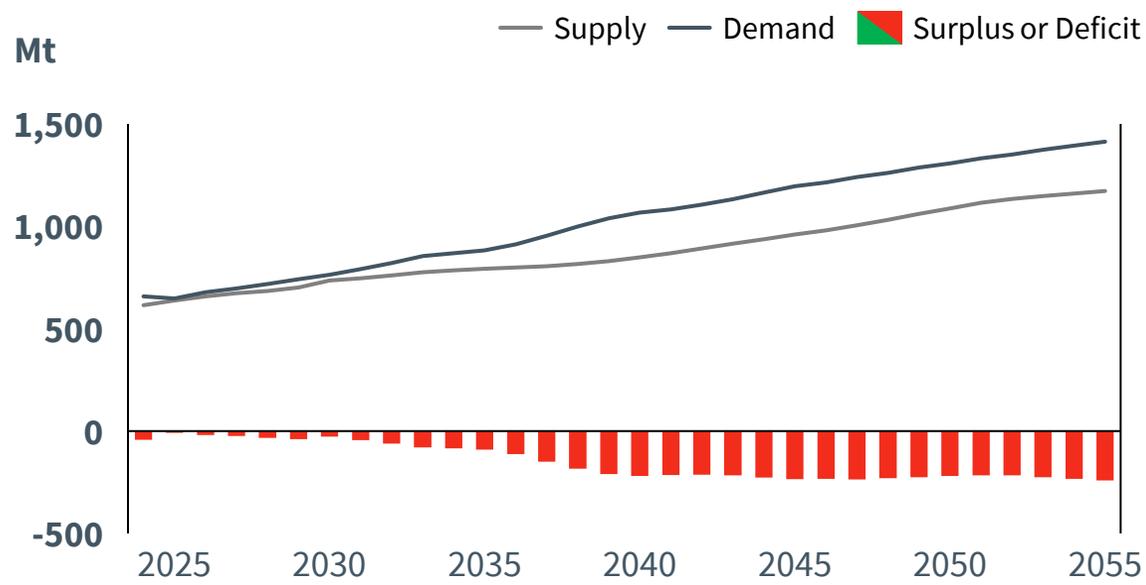
**Key takeaways**

 **Global steel production** shifts from **BOF dominance to an EAF-led mix** driven by decarbonisation targets

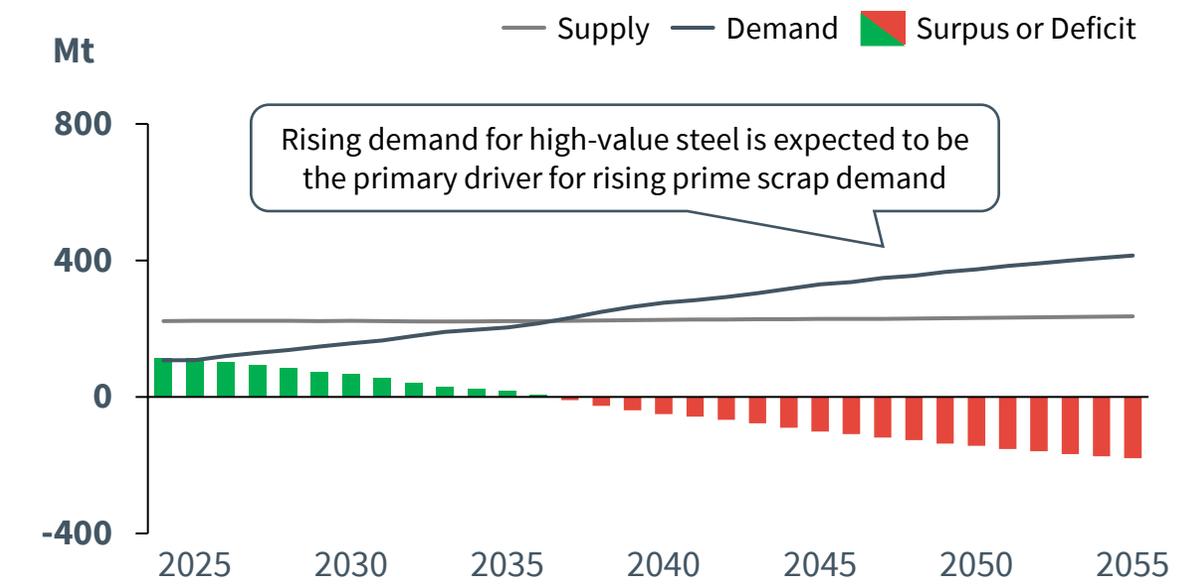
 **EAF penetration to drive demand for clean metallics** such as **scrap and DRI/HBI**

# Rising EAF penetration amid scrap shortages and OBM reliance elevates HBI as the essential complement to constrained prime scrap

**Global Scrap Supply (million tonnes) 2025 - 2055**



**Prime Scrap Supply (million tonnes) 2025 - 2055**



**Key Takeaways**



Global Prime scrap supply expected to tighten, set to drive sustained demand for OBMs such as HBI



Obsolete scrap supply will fall short of meeting accelerating demand, despite supply growth



EAF Adoption



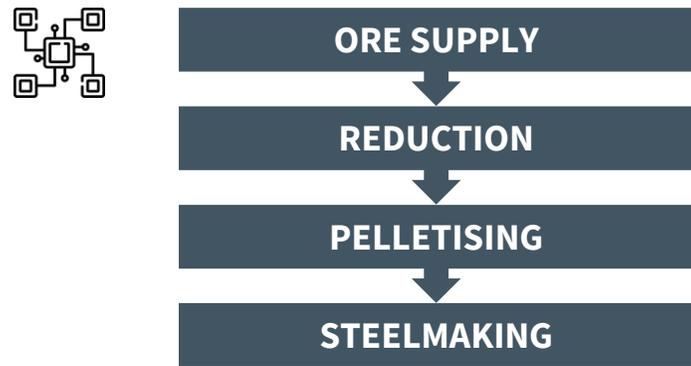
Flat Product Demand



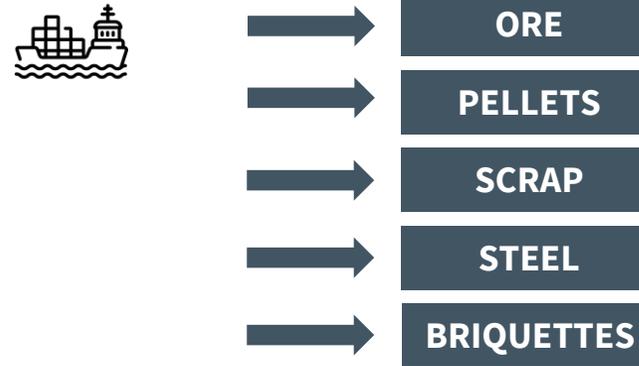
Prime Scrap Demand

# The emergence of green metallic hubs is creating integrated, cost-advantaged ecosystems that reset how HBI is produced and priced

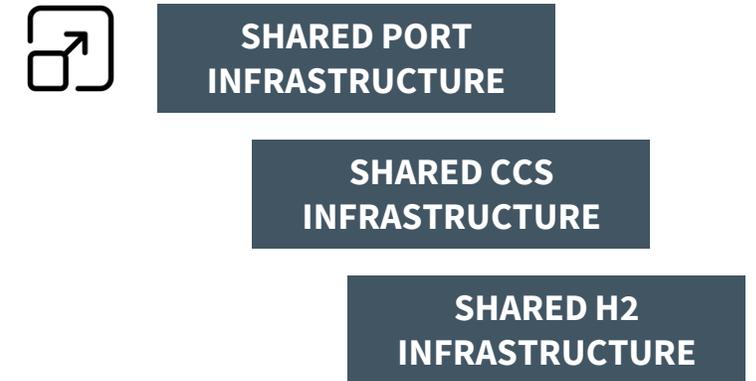
## Value chain integration



## Logistics efficiency



## Economies of scale



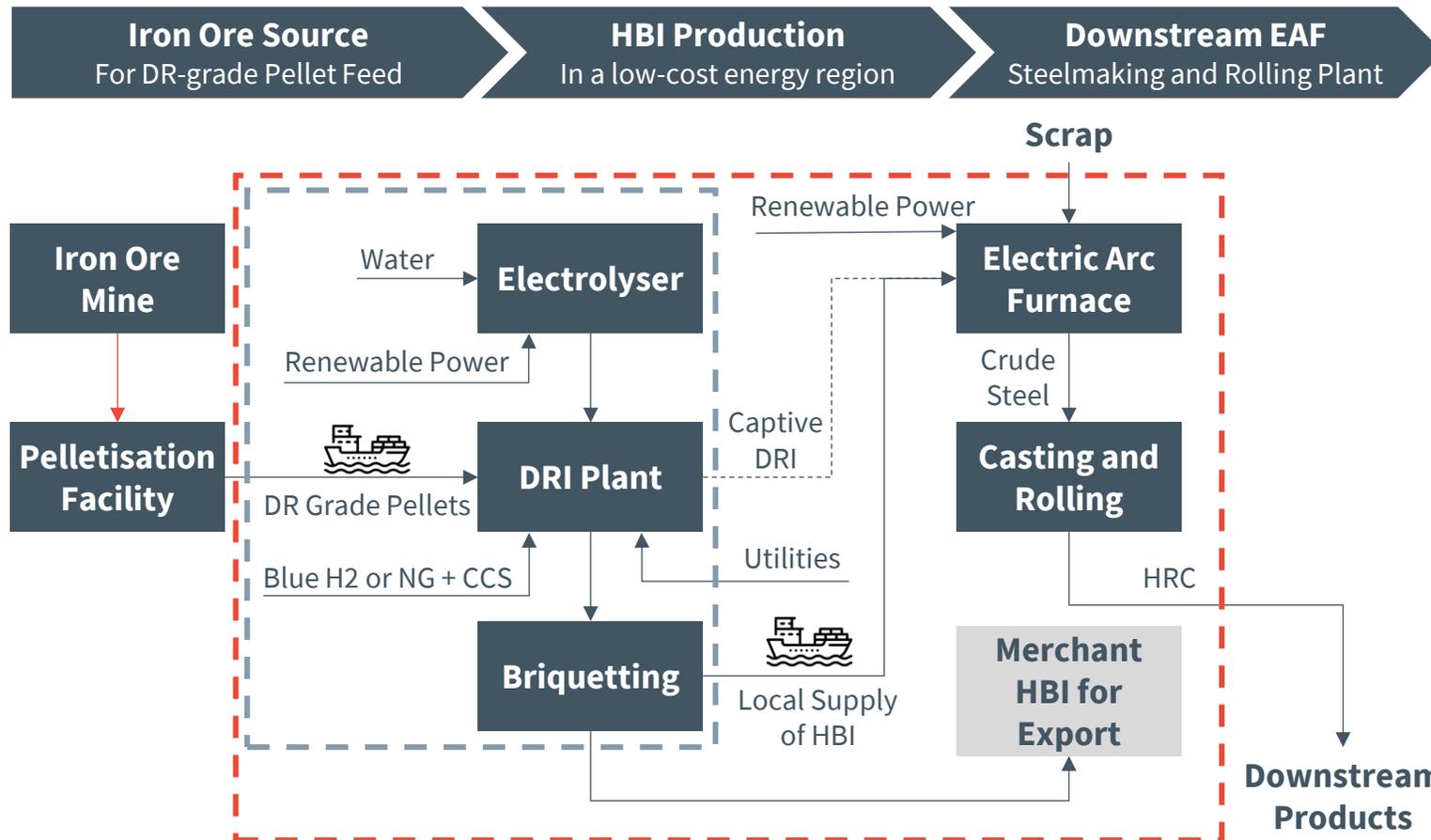
## Green hubs are emerging and resetting HBI's cost dynamics



-  **Steelmaking in MENA:** Largest global DRI platform, deep integration from Ore → DRI → HBI
-  **Brazil + MENA + North America:** Vale Megahubs linking Pelletising + Briquetting + Export
-  **Western Australia + MENA Hydrogen Hubs:** Hydrogen hubs shifting production from NG today to Blue/Green H<sub>2</sub>

# Two green metallic hub models are emerging as the key archetypes shaping the industry's future

## Integrated green HBI and EAF value chain



## Green metallic hub models

### LOCAL GREEN HUBS NEAR DEMAND



Local hubs form near demand centres, producing DRI domestically and supplying nearby EAF plants to enhance regional supply security and align with industrial policy

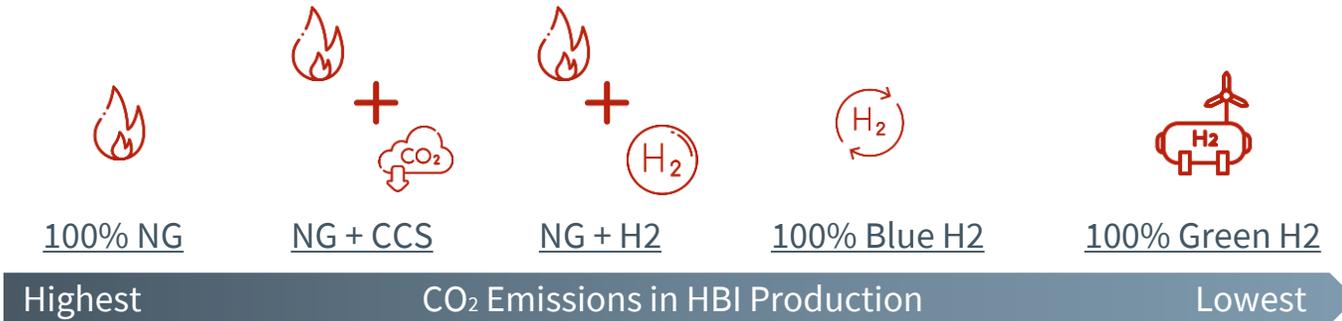
### EXPORT ORIENTED HUBS



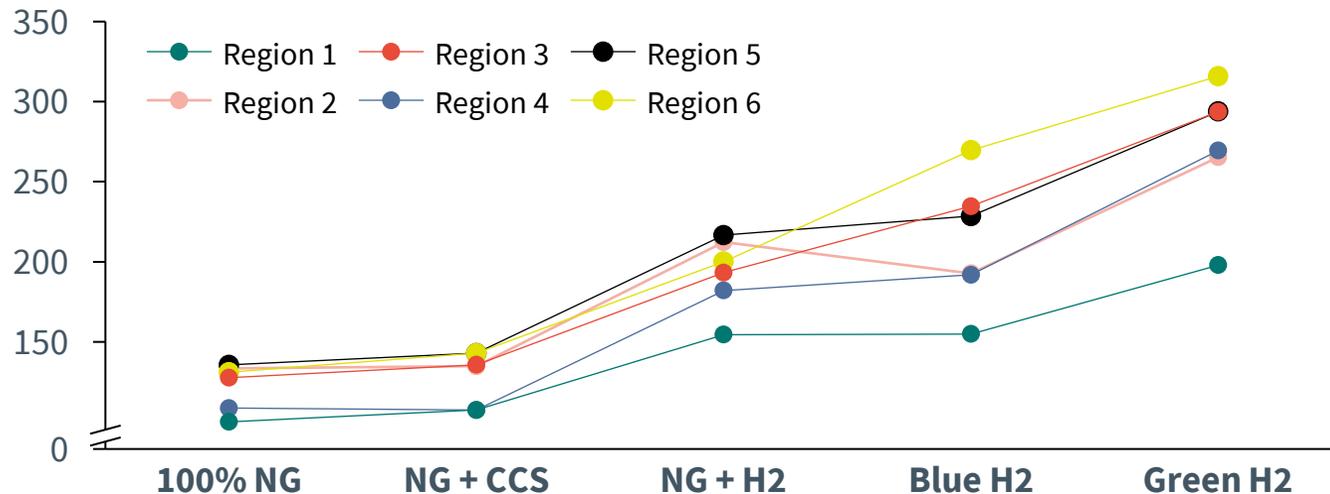
Regions with low-cost renewable energy are planning green metallic hubs aimed at producing and exporting low-carbon HBI to growing EAF steel markets

# Some regions will pull ahead because energy-advantaged, infrastructure-ready locations will lead the shift from conventional to low-carbon metallics

## HBI production routes



## 2025 Indexed HBI Production Cost



## Key takeaways



**Cost competitiveness will cluster in energy-advantaged regions**, where low-cost reductants, utilities and strong logistics enable more attractive DRI/HBI production economics



**Hydrogen-based DRI adoption will progress at different speeds**, driven by renewable energy prices, hydrogen availability, infrastructure maturity and policy support



**Production is likely to shift toward regions with strong permitting and infrastructure**, with DRI increasingly decoupling from steelmaking as producers migrate to lower-cost, low-carbon locations

# As steelmaking undergoes a multi-decade overhaul, the HBI pricing model is evolving with the changing landscape of metallics production and pricing

## Steel industry's shift to ultra-low carbon and the evolution of HBI production across each era



### Why HBI Followed Scrap

**Scrap-Indexed pricing** provided a **stable benchmark**

**HBI supplemented** or substituted prime scrap

**Prime scrap availability** was sufficient

**HBI production** was predominantly **NG-based**

### Four Forces Reshaping Metallics Markets



**EAF adoption accelerating** as decarbonisation pressures intensify implying a structural uplift in DRI & Scrap demand



**Prime scrap demand outpacing supply**, widening the structural deficit



**Divergent carbon policies** reshaping regional competitiveness



**Energy and resource advantaged regions** emerging as industrial hubs for low-carbon metallics

# Distinct NG, CCS, and hydrogen cost bands are breaking scrap-based pricing logic and driving the move from scrap-indexed to cost-driven pricing

## Traditional HBI pricing

*Traditional HBI pricing is anchored to scrap*



Regional Scrap Indices



Freight & Logistics Adjustments



Scrap Market Dynamics



Value-In-Use Adjustments



Quality Differentials



Regional Demand Factors

## Cost driven HBI pricing

*Cost driven HBI pricing is anchored in hubs*



Reductant Pathway Cost



Energy & Gas Economics



Pellet & Ore Access



Infrastructure Scale



Carbon Policy



Capital Recovery

Green metallic hubs are shifting HBI from scrap-linked to cost-led pricing, creating distinct markets for grey and low-carbon HBI

# Carbon policy is turning emissions into a pricing signal, as CBAM, ETS schemes, and hydrogen-route differentiation make carbon a direct price determinant

## Old pricing model (carbon as an externality)



Emissions not monetised



Grey and Low carbon HBI treated equally

### Pricing Structure



Undifferentiated Pricing

## New pricing model (carbon as a cost driver)



Carbon Costs Penalise Grey HBI



Low Carbon HBI Valued



Market Spread Widens

### Pricing Structure



Carbon Policy drives HBI Pricing from 'Undifferentiated' to 'Visibly segmented'

# Carbon policy is turning emissions into a pricing signal, as CBAM, ETS schemes, and hydrogen-route differentiation make carbon a direct price determinant

## Key drivers of HBI price decoupling



**Accelerating EAF adoption**



**Growing prime scrap deficit**



**Carbon Policies and Taxation**



**Emergence of Green Metallic Hubs**

## Reinforcing mechanisms for decoupling

Divergence of marginal cost centres

Carbon policy and product differentiation

Transition to incentive-driven pricing for new supply

## Market outcomes enabling decoupling



As **HBI supply shifts from captive plants to green metallic hubs**, merchant trade is expanding



**Greater liquidity and transparent transactions** will support the emergence of dedicated HBI indices, further **weakening the role of scrap as the benchmark**

**Merchant Trade Growth + Market Transparency = HBI pricing based on cost fundamentals, not scrap**

# How the industry must adjust capacity, pricing, and supply dynamics to navigate HBI decoupling

## Industry Response

Significant increase in value assigned to clean metalics

De coupling of DRI/HBI prices from scrap needed to incentive new capacities

Steel prices adjustments can put brakes on decoupling

## Market and pricing implications of these actions

- + A structural shortage of prime scrap will drive a strong growth in demand for DRI and HBI. It will be a key metallic for production of flat products by EAFs
- + Securing clean metalics like HBI will be critical for production of high-quality flat products, cost control and compliance
  
- + This will change how steel producers will assign value to clean metalics.
- + HBI Pricing will decouple away from scrap-based benchmarks to a cost-based model. This is pivotal to incentive DRI production and bring more capacity to the market.
  
- + Markets with strong carbon policies and existing mature HBI/DRI production supply chain are likely to adopt incentive pricing sooner, while traditional scrap-linked, markets experience growing misalignment.
- + This will increase the HBI prices and in turn drive up the steel prices. Steel markets will need time to adjust to a new equilibrium, and this can put the brakes on the pace of decoupling



Thank you.

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