



Brazil Climate
Summit.



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GROUP

Seizing Brazil's potential as a global hub for green industrial products

A CASE STUDY ON STEEL & ALUMINUM

BRAZIL CLIMATE SUMMIT PARIS **May 2025**

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In partnership with



Brazil Climate Summit.



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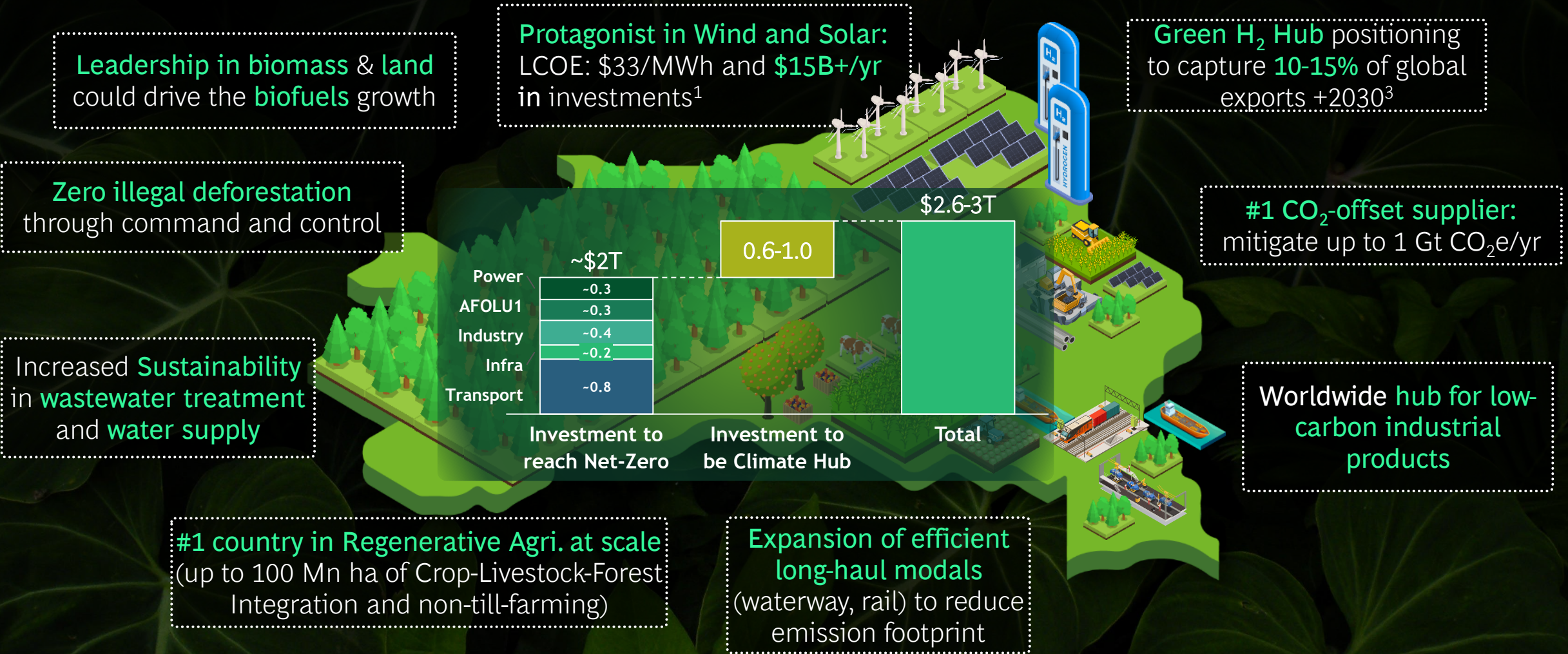


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Brazil can be a global forerunner towards a low-carbon future, leveraging its innate advantages—and unlocking \$2–3T in investments until 2050



1. Average Levelized Cost of Energy for wind & Solar plants, considering experts inputs, capacity expansion as disclosed by ONS in 2023, and average renewable energy investments in Brazil between 2015-2022 as reported by UNCTAD in 2023 3. BCG estimates

... which has been explored in Brazil Climate Summit's reports since 2023—
today we present the case for green industrial hub

Leadership in biomass & land
could drive the biofuels growth



BCS NY Sept. 2024

Green H₂ Hub positioning
to capture 10-15% of global
exports +2030³

BCS Sept. 2023



BCS EU May 2024



#1 country in Regenerative Agri. at scale
(up to 100 Mn ha of Crop-Livestock-Forest
Integration and non-till-farming)

Worldwide hub for low-
carbon industrial products

Today's focus: Steel and
Aluminium value chains

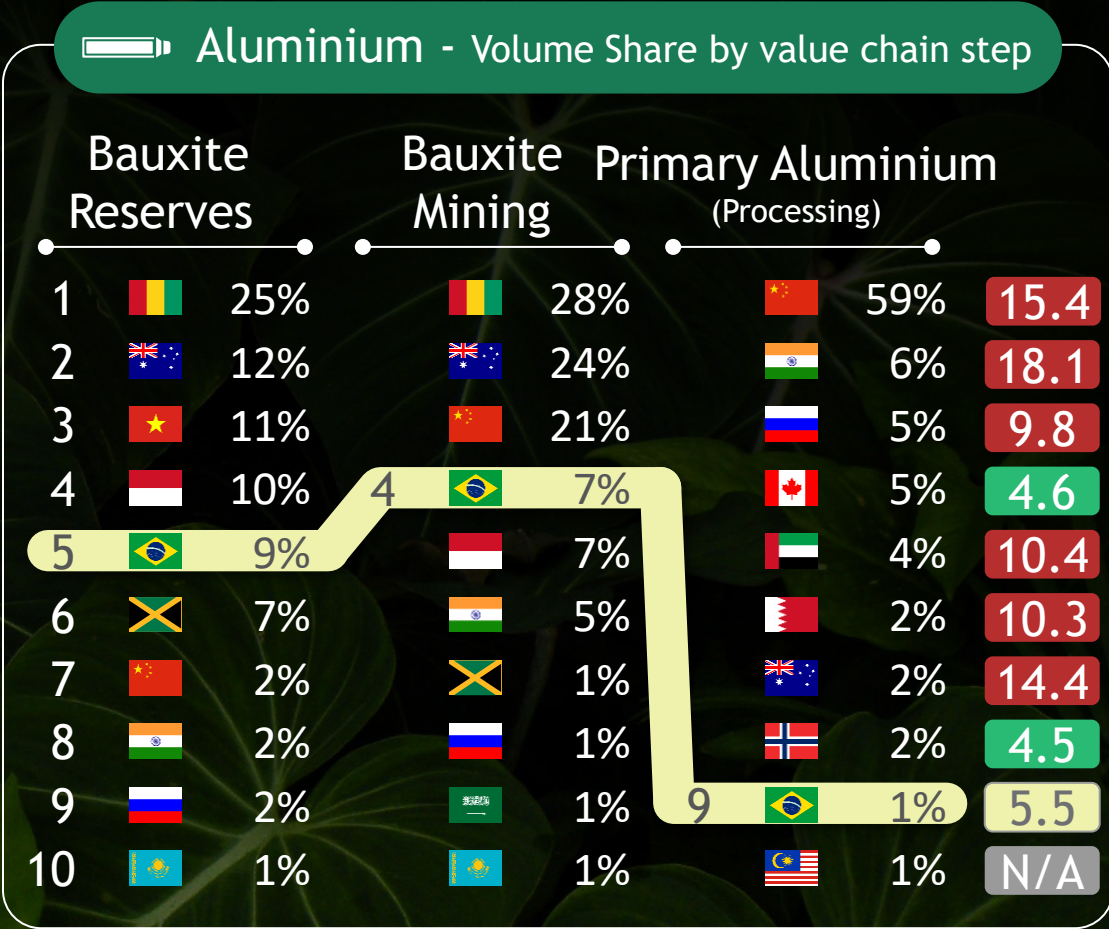
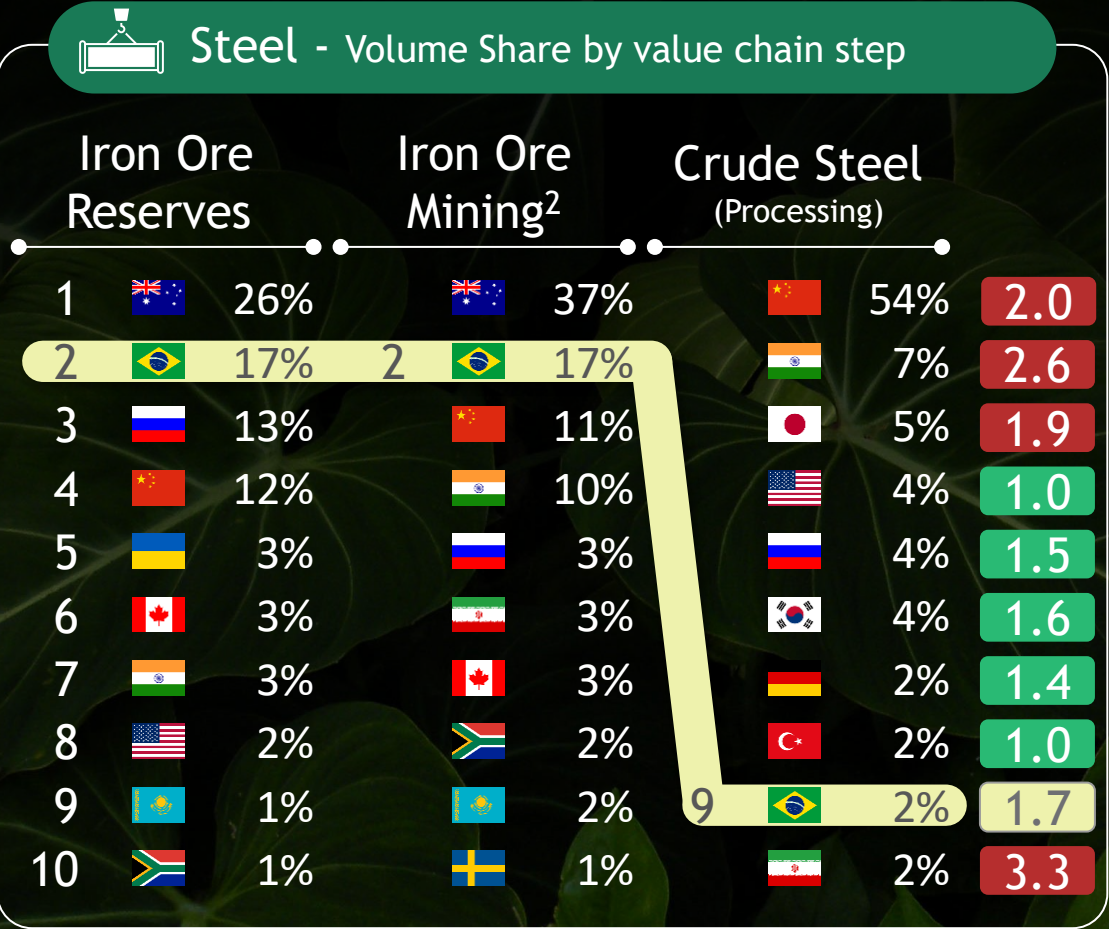
~20 - 22x
BR's current
exports to the EU

~15 - 25%
Reduction in EU
Scope 3 emissions

~€10 - 15 B
Investment
opportunity

1. Assume potential of NBS in a price-competitive scenario with carbon price at \$70/ton CO₂. 2. Average LE disclosed by ONS in 2023, and average renewable energy investments in Brazil between 2015-2022 as reported by BCS.

Brazil has untapped potential to decarbonize steel & aluminium value chains...



Estimated emissions intensity¹ (tCO2e/t) **xx** Higher than Brazil's **xx** Lower than Brazil's

Note: Mining and Processing volumes based on 2023 figures. Malaysia steel emissions intensity based on leading player's (Press Metal) emissions
1. Estimates for aluminium emissions intensity relates to Primary Aluminium Production (Alumina Production + Smelting) only. 2. Usable Iron Ore Figures
Source: USGS Mineral commodity Summaries 2025 (mining and processing: 2023 data) - Iron Ore / Bauxite and Alumina; World Steel Association, Global Efficiency Intel BCG analysis

... as an illustration, if Brazil were to reach in processing the same share it holds in key raw materials production, emissions could decrease by up to 5%

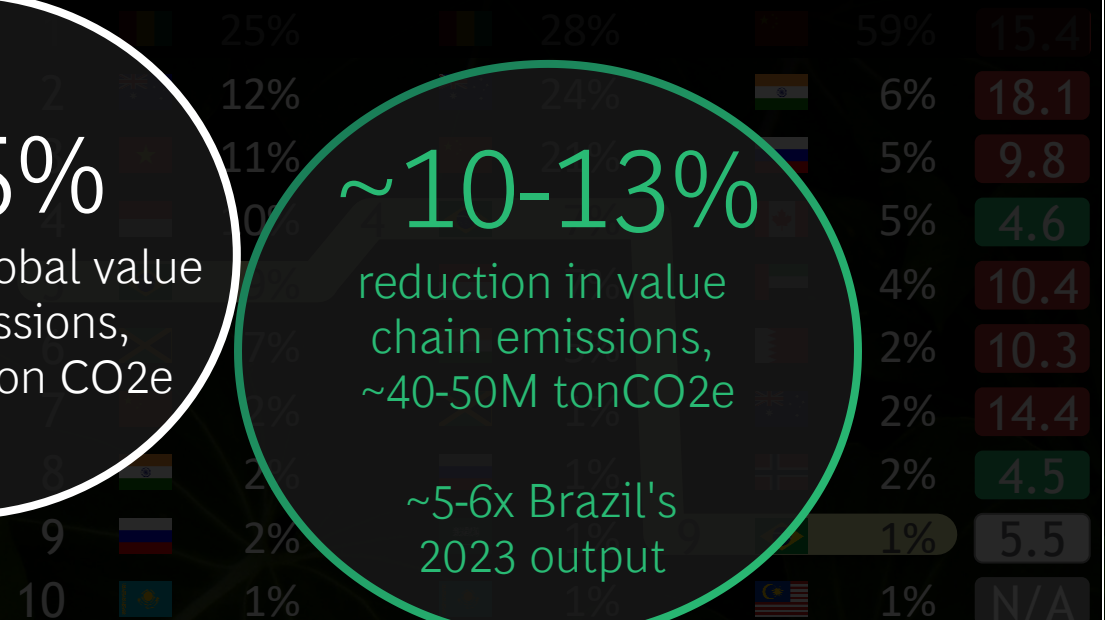
Steel - Volume Share by value chain step

Reaching **17%** of the steel processing, displacing production from higher-emitters:



Aluminium - Volume Share by value chain step

Reaching **9%** of the primary aluminium processing, displacing production from higher-emitters:

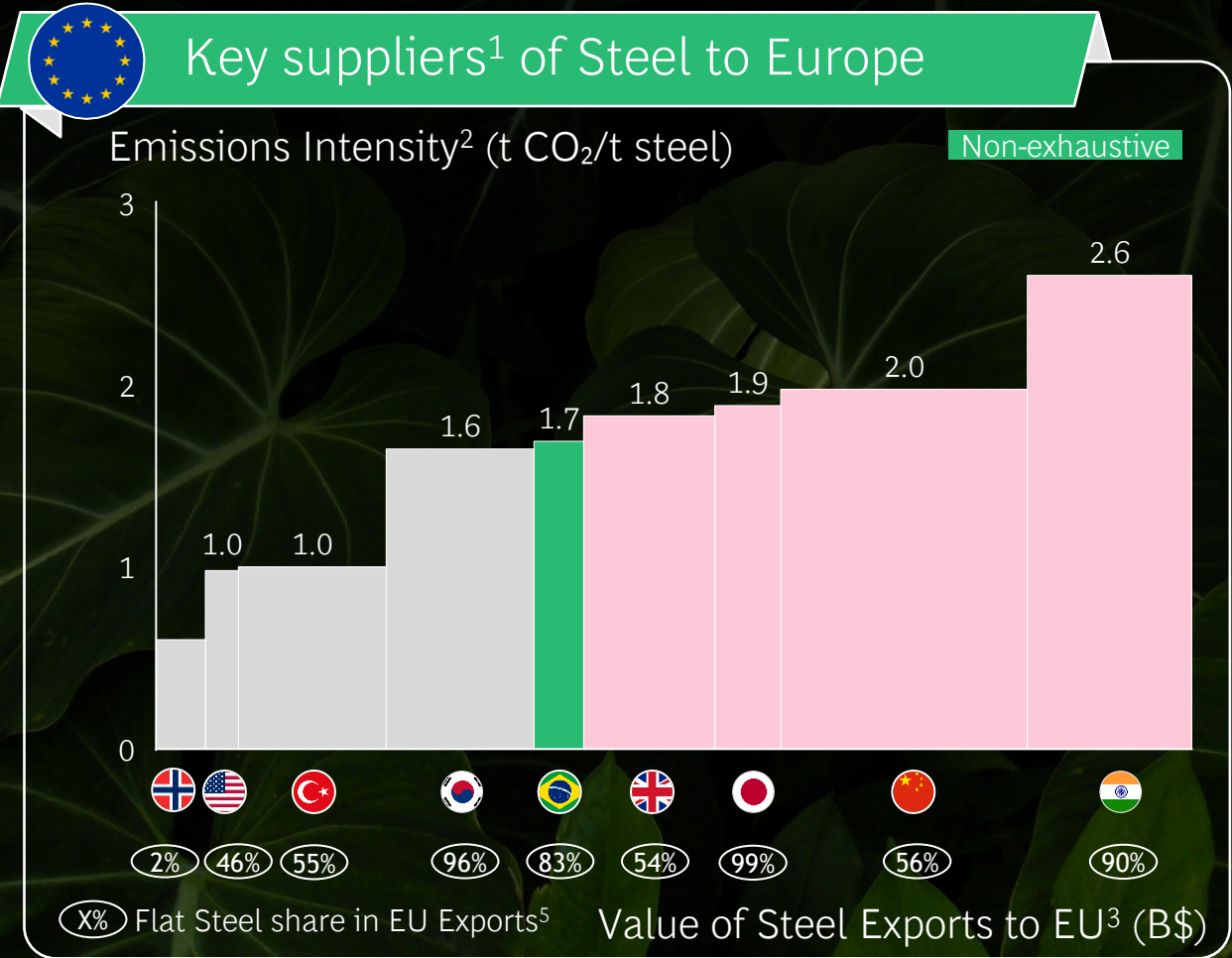


~4-5%
reduction in global value chains emissions,
~125-165M ton CO₂e

Note: Displacement of crude steel / primary aluminium considered for higher emitters than Brazil, respectively. Displaced volume per country based on volume share within group of nations with higher emissions. Emissions intensity assumed constant (2023 values). Installed production capacity ignored for the purposes of this theoretical exercise. Range utilized 80-100% of full potential.

Brazil is already a key low-emission steel supplier to the EU...

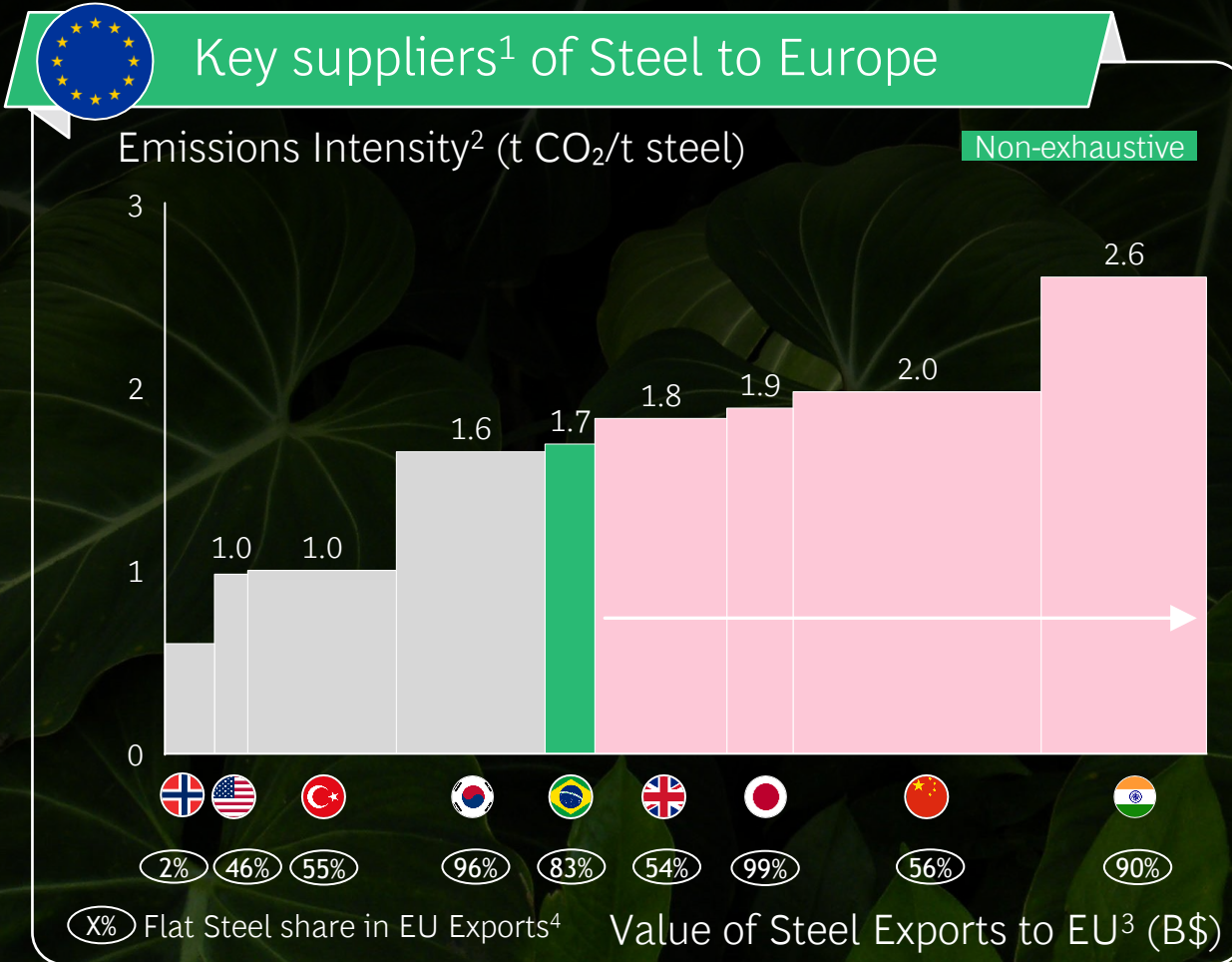
Steel case



Note: Estimate based on 2024 import volumes. Assumes no significant GHG emissions reduction from high-emitters. Brazilian iron & steel is considered low-emission, based on H₂-DRI pathways with an estimated intensity of 0.5 – 0.8 tCO₂e/t. The scenario reflects a potential shift of current imports from China, India, Japan and UK to Brazil, assuming Brazil develops the production capacity to meet this demand. 1. Selected supplier countries account for ~63% of total EU Steel imports, excluding EU intraflows. Relevant countries such as Russia and Ukraine not plotted due to carbon intensity data unavailable. 2. Source: IAB. 3. Source for USD value of exports: Trade Map, Source for volume (ton) value of exports: EuroStatt. 4. Potential emissions intensity level for Brazilian Steel after successfully applying decarbonization levers. 5. Share of flat steel in long + flat exports to EU. It does not include other categories, such as semi-finished products. Source: IEA, Press Search, Expert interview, BCG analysis

... and could potentially reduce EU scope 3 emissions by displacing higher-emitters countries...

Steel case



EU companies could cut up to ~13% (13 Mt CO₂e / year) of its Scope 3 emissions embedded in imported steel if Brazil captures share from high-emitters, increasing BR's exports⁵ to EU in ~20x

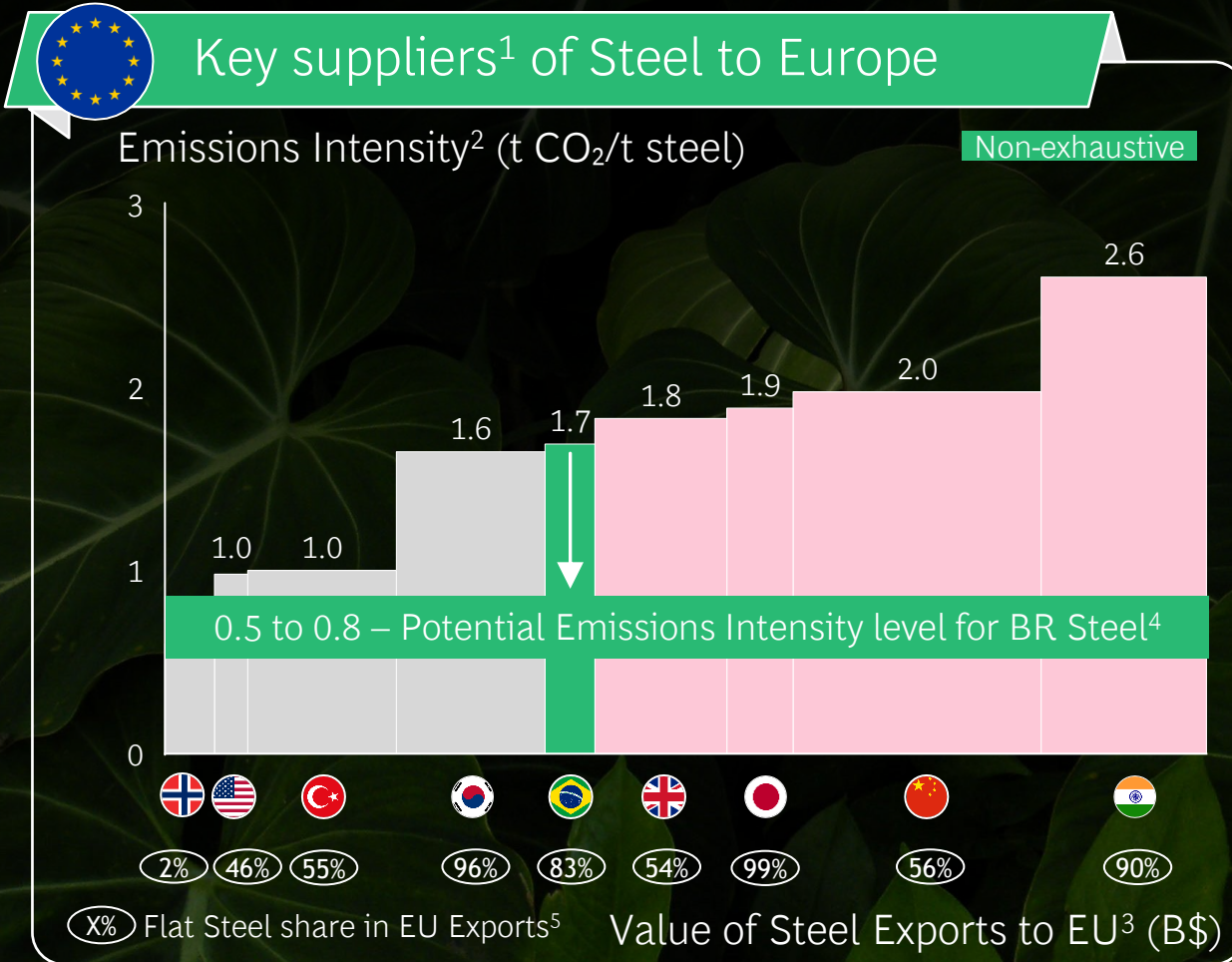
BR requirements to shift exports:

- Expand production capacity, adapting to product mix demand (flat vs. long)...
- ... while increasing its cost competitiveness

Note: Estimate based on 2024 import volumes. Assumes no significant GHG emissions reduction from high-emitters. Brazilian iron & steel is considered low-emission, based on H₂-DRI pathways with an estimated intensity of 0.5 – 0.8 tCO₂e/t. The scenario reflects a potential shift of current imports from China, India, Japan and UK to Brazil, assuming Brazil develops the production capacity to meet this demand. 1. Selected supplier countries account for ~63% of total EU Steel imports, excluding EU intraflows. Relevant countries such as Russia and Ukraine not plotted due to carbon intensity data unavailable. 2. Source: IAB. 3. Source for USD value of exports: Trade Map, Source for volume (ton) value of exports: EuroStatt. 4. Share of flat steel in long + flat exports to EU. It does not include other categories, such as semi-finished products. 5. This scenario considers a potential BR export volume to EU of 20 – 22 Mt, vs. the current export values of 1 Mt. Source: IEA, Press Search, Expert interview, BCG analysis

... an impact that could grow further if Brazil reduced its emission intensity profile

Steel case



EU companies could cut up to 30 – 40%(30 - 40 Mt CO₂e / year) of its Scope 3 emissions embedded in imported steel if Brazil further reduce its emission intensity profile

BR levers to achieve even lower emission rates:

- Scale up scrap-based / lower-emission routes
- Improve financing for decarb. solutions
- Reduce demand uncertainty

Note: Estimate based on 2024 import volumes. Assumes no significant GHG emissions reduction from high-emitters. Brazilian iron & steel is considered low-emission, based on H₂-DRI pathways with an estimated intensity of 0.5 – 0.8 tCO₂e/t. The scenario reflects a potential shift of current imports from China, India, Japan and UK to Brazil, assuming Brazil develops the production capacity to meet this demand. 1. Selected supplier countries account for ~63% of total EU Steel imports, excluding EU intraflows. Relevant countries such as Russia and Ukraine not plotted due to carbon intensity data unavailable. 2. Source: IAB. 3. Source for USD value of exports: Trade Map, Source for volume (ton) value of exports: EuroStatt. 4. Potential emissions intensity level for Brazilian Steel after successfully applying decarbonization levers. 5. Share of flat steel in long + flat exports to EU. It does not include other categories, such as semi-finished products. 6. This scenario considers a potential BR export volume to EU of 20 – 22 Mt, vs. the current export values of 1 Mt. Source: IEA, Press Search, Expert interview, BCG analysis

Four levers should be addressed for Brazil to seize the full potential as a global supplier of green steel and aluminium

Further decarbonize value chains using its unique advantages



Leverage scrap-based and lower-emission routes, to scale green steel and aluminium through Brazil's unique advantages

Improve financing for decarbonization solutions



Enable attractive financing mechanisms (e.g., Eco Invest, BIP) to accelerate decarbonization

Price carbon externalities



Advance mechanisms (e.g., carbon pricing) to level the playing field and close the carbon cost gap

Reduce demand uncertainty



Stimulate demand signaling via sector-specific offtakes (e.g., FMC) and public procurement



Disclosure & Transparency

... while increasing scale and cost competitiveness of local industry



Further decarbonize
value chains



Improve financing for
decarb solutions



Price carbon
externalities



Reduce demand
uncertainty

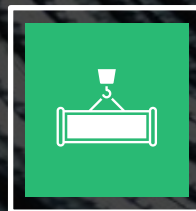


Explore untapped potential in circularity and scrap-based routes for Steel and Aluminium

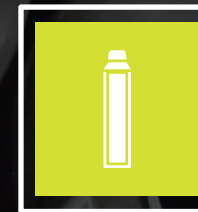
Increase scrap recovery efficiency rate up to global benchmarks and leverage momentum created by new national circularity policies

Decarbonize steel by
leveraging edge in energy
and raw materials

Scale low-carbon alternatives
leveraging biomass-based
charcoal, biomethane and
hydrogen potential



Strategic drivers
can amplify Brazil's
green advantage in
decarbonizing steel
and aluminium
value chains



Enhance competitiveness
pursuing near-zero green
aluminium

Elevate low-carbon
aluminium advantage by
expanding electrification
based on renewable-heavy
grid and biogas potential

Government-backed initiatives are accelerating decarbonization by mobilizing local and foreign capital

Selected examples

Brazil Investment Platform (BIP)

Launched in 2024 to drive ecological transformation and industrial decarbonization, led by the Ministry of Finance and BNDES²

\$ 21.5 B across 13 pilot projects


Fortescue.

\$ 3.5 B green hydrogen plant


VALE

\$2.5 B for green H2 and HBI¹ production Hubs

Eco Invest Brasil

Aims to attract foreign private capital to finance Brazil's ecological transformation, leveraging Blended Finance

Investment potential of over \$ 7 B³





\$ 6.2 B from major banks and \$ 1.1 B from government



\$1 B from the Climate Fund and +\$0.5 B in private capital

1. Hot Briquetted Iron Source: Brazil's Ministry of Finance; Press releases; 2. Strategic partners: Bloomberg Philanthropies, GFANZ, Green Climate Fund; 3. First auction unlocked investment potential of over US\$ 7B. Second auction launched in Apr/25.; Note: all figures in US dollars

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Currently, CBAM embedded emissions will only include Scope 1 for imported aluminium, keeping China's price advantage over Brazil...

Theoretical exercise

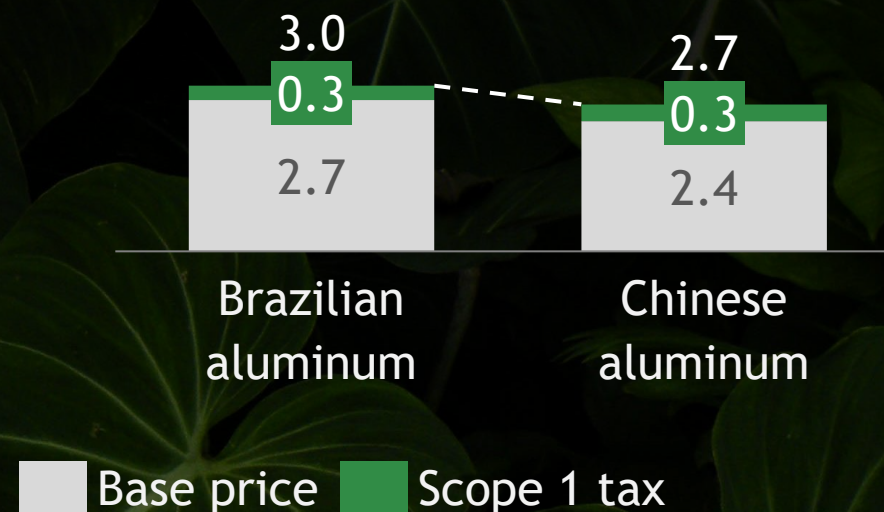
Similar estimated Scope 1 emissions...

Estimated carbon intensity (tCO₂e / t)



...lead to a slight price advantage to China

Estimated EU CBAM aluminium price (\$K/t)



Note: Potential effect of free allowances and optimization levers not considered;

1. Aluminium base price = average from unwrought aluminium exports from Brazil and China to the EU (2024), FOB, exc. Intra-EU trade;

Scope 1/2 additional price = (tCO₂e relative to scope 1/2 per ton of Aluminium exported to the EU) * (\$84 / ton)

Source: Regulation (EU) 2023/956 of the EU Parliament (May/23); CBAM - FAQ (Nov/23); IAI GHG Pathways (Sep/21); ComStat; UN Comtrade Database; BCG analysis

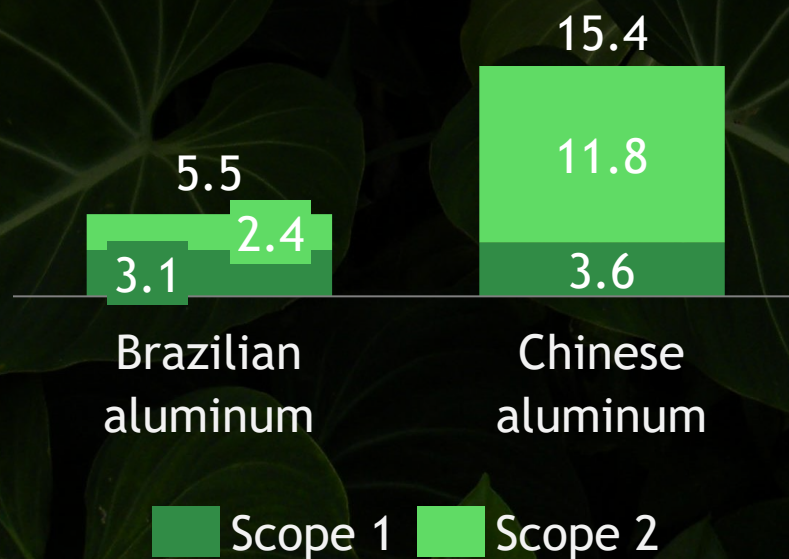


...but inclusion of Scope 2 could shift price advantage towards Brazil and reduce EU companies' scope 3 emissions

Theoretical exercise

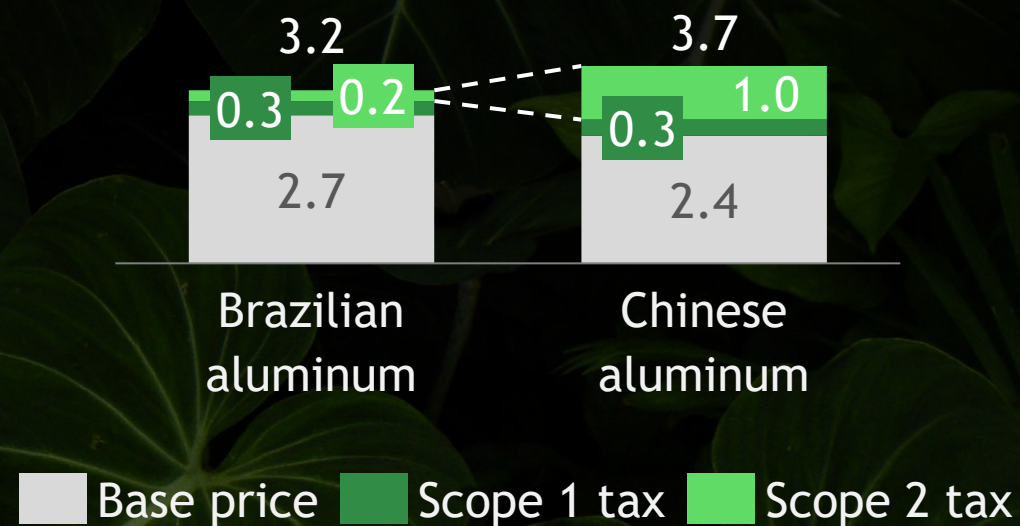
Large difference considering scope 2...

Estimated carbon intensity (tCO₂e / t)



...altering price advantage scenario

Estimated EU CBAM aluminium price (\$K/t)



Note: Potential effect of free allowances and optimization levers not considered;

1. Aluminium base price = average from unwrought aluminium exports from Brazil and China to the EU (2024), FOB, exc. Intra-EU trade;

Scope 1/2 additional price = (tCO₂e relative to scope 1/2 per ton of Aluminium exported to the EU) * (\$84 / ton)

Source: Regulation (EU) 2023/956 of the EU Parliament (May/23); CBAM - FAQ (Nov/23); IAI GHG Pathways (Sep/21); ComStat; UN Comtrade Database; BCG analysis



European players have set the bar high on emissions' related commitments – critical to materialize concrete action

Selected examples ¹



Steel

1.3 Mt/year by 2025

Pilot agreement for near-zero emission steel supply (via H₂-DRI plant)



Plans to decarbonize all steel from SSAB for Scania's heavy-duty vehicles



70-90% scrap since 2023

Exclusive offtake for recycled and low-carbon steel supply



Aluminium

\$2.5B investment in 2023

Partnership for closed-loop recycling plant.



Agreement to supply near-zero emission aluminium and deploy innovative transport at mining sites.



\$130M investment in 2022

Closed-loop agreement and new recycling center in France for EV models.



1. Selected offtake agreements by First Movers Coalition members. Sources: WEF COP28 Impact Brief (2023)

Increasing imports of low-carbon steel and aluminium from Brazil offers major decarbonization and investment opportunities for EU companies

Volume Captured¹

~20 – 22x

BR's current
EU exports

Emissions reduction²

~15 – 25%

(~35 – 50 M)

ton. CO₂e / year

Investment opportunity³

~ € 10 – 15 B

Assuming Brazil captures **exports to EU from higher-emitters** on Steel & Aluminium, helping EU companies meet Scope 3 targets...

... creating opportunities to **invest in expanding Brazil's low-carbon processing capacity** to meet EU demand

Note: Estimates based on 2024 import volumes. 1. Considers a potential BR export volume to EU of 20 – 22 Mt of steel and aluminium combined, vs. the current BR combined EU export values of 1,1 Mt. 2. Considers the potential emissions reduction combined from steel and aluminium exports to EU, from a current baseline value of ~212 M t. CO₂e/year. 3. Estimated Capex to build additional low-carbon capacity for steel and aluminium in Brazil. Calculated considering an average cost of 360 USD/ton for long steel, 1049 USD/ton for flat steel and 400 USD/ton for aluminium. 15
Costs were based on recent capacity expansion projects in South America for low-carbon steel and aluminium. Source: BCG analysis



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Thank you!