



BRAZILIAN CHAMBER
OF COMMERCE IN GREAT BRITAIN



Department for
Business & Trade

ALLEN & OVERY

Hydrogen in Brazil

1 March 2024





Vale Energy And Decarbonization Hydrogen Strategy

Disclaimer

This presentation may include statements that present Vale's expectations about future events or results. All statements, when based upon expectations about the future and not on historical facts, involve various risks and uncertainties. Vale cannot guarantee that such statements will prove correct. These risks and uncertainties include factors related to the following: (a) the countries where we operate, especially Brazil and Canada; (b) the global economy; (c) the capital markets; (d) the mining and metals prices and their dependence on global industrial production, which is cyclical by nature; and (e) global competition in the markets in which Vale operates. To obtain further information on factors that may lead to results different from those forecast by Vale, please consult the reports Vale files with the U.S. Securities and Exchange Commission (SEC), the Brazilian Comissão de Valores Mobiliários (CVM) and in particular the factors discussed under “Forward-Looking Statements” and “Risk Factors” in Vale’s annual report on Form 20-F.

Cautionary Note to U.S. Investors - The SEC permits mining companies, in their filings with the SEC, to disclose only those mineral deposits that a company can economically and legally extract or produce. We present certain information in this presentation, including ‘measured resources,’ ‘indicated resources,’ ‘inferred resources,’ ‘geologic resources,’ which would not be permitted in an SEC filing. These materials are not proven or probable reserves, as defined by the SEC, and we cannot assure you that these materials will be converted into proven or probable reserves, as defined by the SEC. U.S. Investors should consider closely the disclosure in our Annual Report on Form 20-K, which may be obtained from us, from our website or at <http://http://us.sec.gov/edgar.shtml>.

Introducing Vale

A global mining company with strategic assets

One of the largest global producers of iron ore, pellets and nickel

The main global player of dry bulk seaborne



Present in 21 countries

\$ 42 bn revenues
\$ 19 bn EBITDA¹

A US\$ 58 billion² market value, with high liquidity in B3 and NYSE

2,700 km of railways, 7 ports, distribution centers and terminals

Dedicated fleet of +100 large carrier vessels

Operator of the most efficient vessel in the world (Valemax)

¹ Pro-forma. Excluding expenses related to Brumadinho and COVID-19 donations
² as of 2024, Feb 28th



OUR DECARBONIZATION STRATEGIC GOALS:

REDUCE SCOPE 1 AND 2 EMISSIONS BY 33% BY 2030

**100% OF RENEWABLE ELECTRICITY IN BRAZIL (2025)
AND GLOBALLY BY 2030**

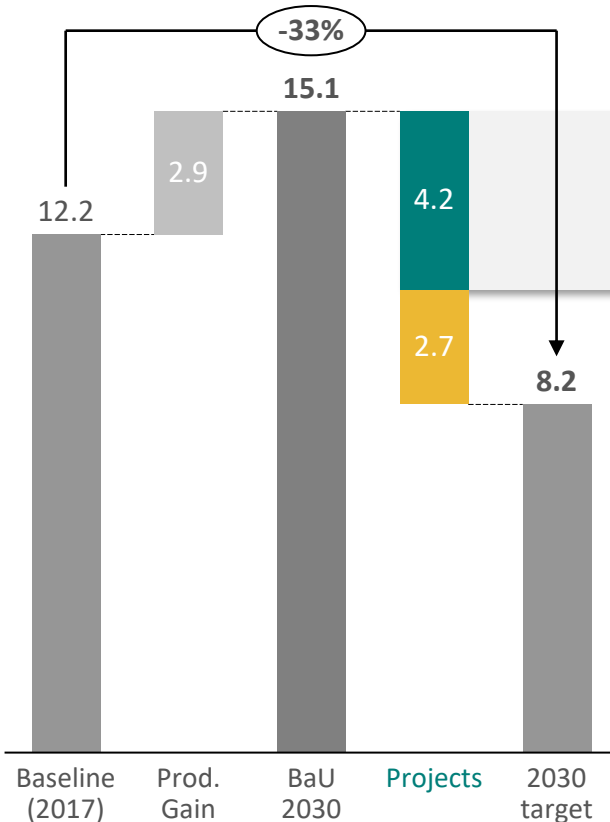
REDUCE NET SCOPE 3 EMISSIONS BY 15% BY 2035

NET ZERO SCOPE 1 AND 2 EMISSIONS BY 2050

To achieve a 33% absolute GHG reduction by 2030, Vale's Roadmap will significantly transform our energy matrix

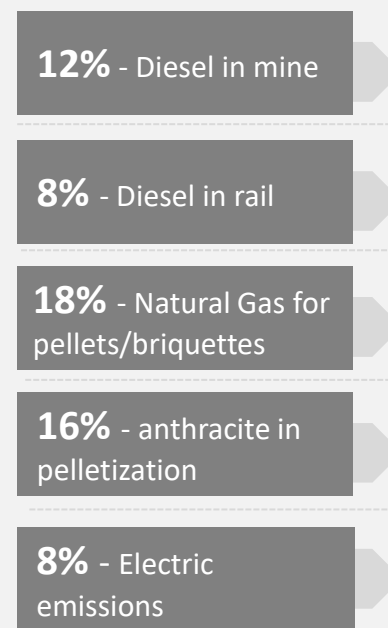
NON-EXHAUSTIVE

Vale's mid-term target
Mt CO₂eq



Main Iron Solutions Emissions by 2030 – BaU¹

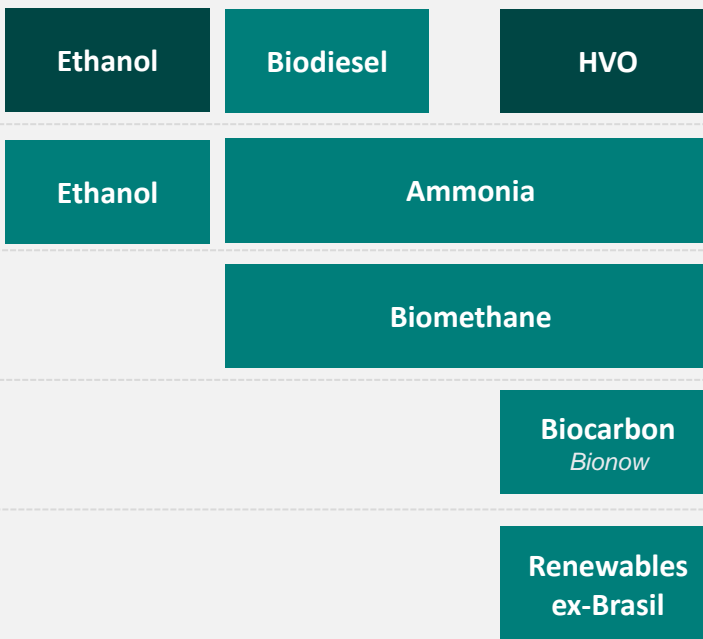
■ Prioritized solutions



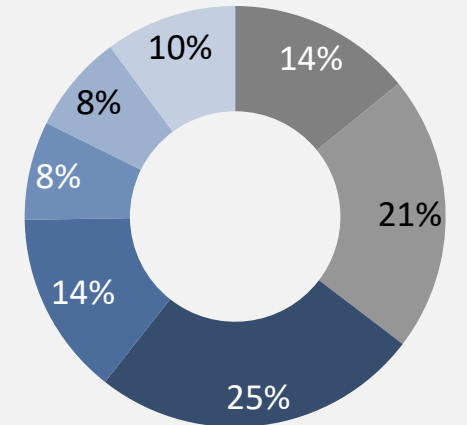
Decarbonization solutions under evaluation

Technical and/or regulatory challenges

Supply challenges

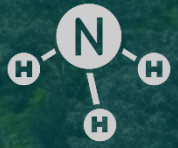


Aspirational matrix for Vale 2030



- Natural Gas
- Diesel
- Renewable Electricity
- Biocarbon
- Biomethane
- Ammonia
- Biodiesel, Ethanol and other renewable fuels

Note 1: Business As Usual, Masterplan 2023 – September adjustment
Source: Energy & Decarbonization team, Climate Change team



AMMONIA AS A FUEL FOR CARAJÁS RAILWAY (EFC)



- A** São Luís
- B** Açailândia
- C** Marabá

Vale
Vale now
Press
7/13/23 • Innovation, Railways
Vale partners with Wabtec on alternative fuels study and orders three FLXdrive battery electric locomotives

The EFC is a railway stretching 900 km through the Brazilian states of Pará and Maranhão. Its fleet comprises over 270 diesel-powered locomotives, accounting for approximately 7% of Vale's scope 1 greenhouse gas emissions. Replacing diesel by low carbon ammonia is our main strategy to decarbonize EFC.

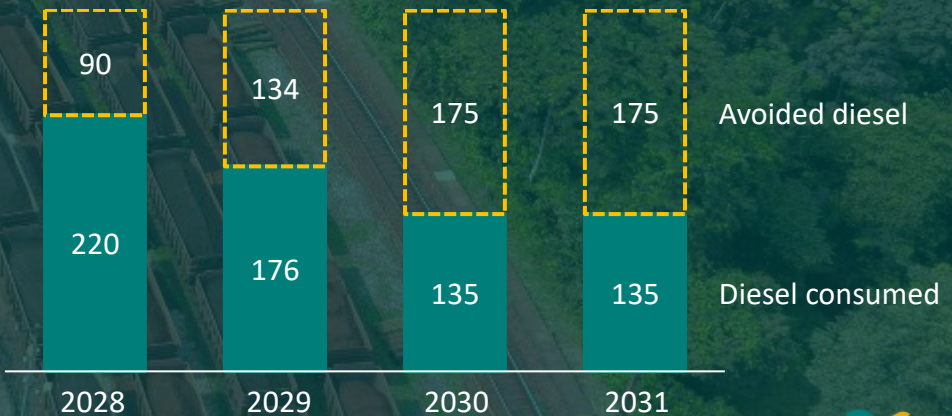


By 2030, we could replace **55~60%** of the diesel consumed in Railway Carajas with low carbon ammonia.



To guarantee this demand, we would need to supply **320 kton** per year of ammonia by 2030.

Diesel avoided forecast at EFC, Mi L Diesel



Decarbonization of the iron and steel industry is vital to meet climate change mitigation targets and reach a sustainable future for the industry

Iron and Steel Industry

- ✓ Respond to **7–9% of global greenhouse gas emissions**
- ✓ Blast Furnace – Basic Oxygen Furnace (BF-BOF) process has **limited CO₂ emission reduction potential**

Steelmaking processes

- ✓ About **75% of steel** is produced using the BF-BOF route, that **emits ~2t of CO₂/ t crude steel**
- ✓ Alternative route, Direct Reduction – Electric Arc Furnace (DR-EAF), can **reduce more than 50% CO₂ emissions with natural gas and lead to net zero emissions with H₂**
- ✓ **Other green routes are in development, but at early stage of development**

Vale's Iron Ore Solutions support our clients decarbonization pathways



Optimizing our product portfolio by increasing the supply of higher grade products



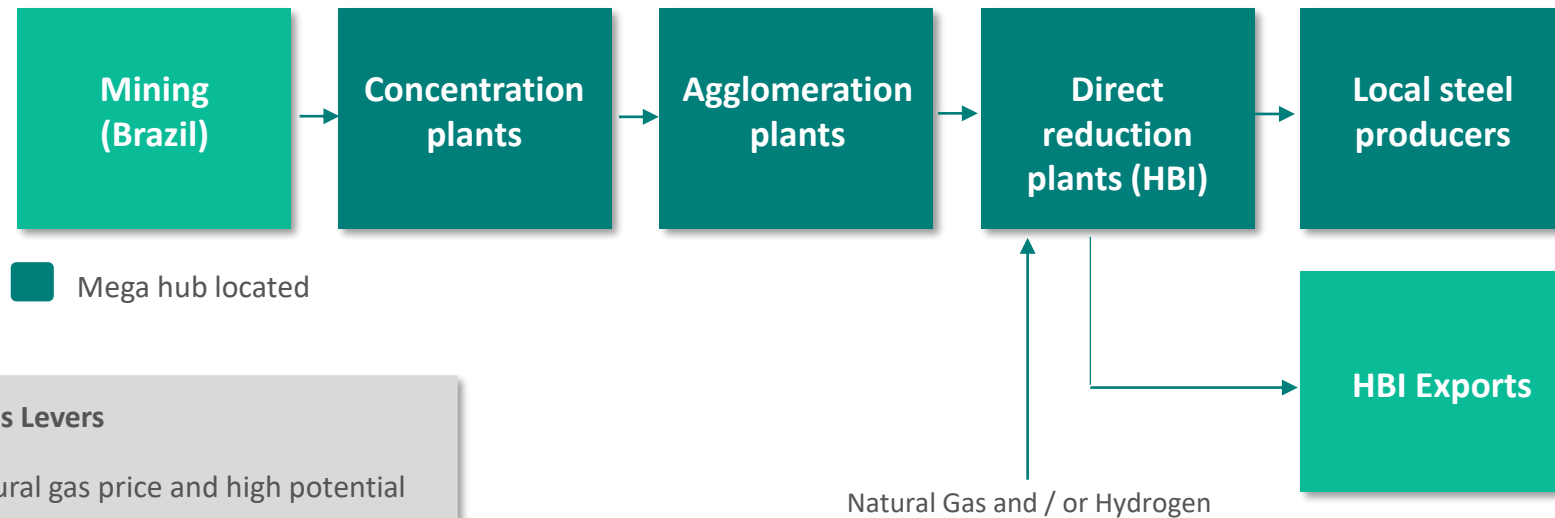
Developing innovative solutions such as the cold agglomeration process, i.e. Briquettes



Promoting tailor made solutions for the steel industry, such as Mega Hubs

MegaHubs are designed produce green steel or HBI in cost competitive locations

MegaHubs Design



Key Competitiveness Levers

- ✓ Competitive natural gas price and high potential for green hydrogen
- ✓ Good infrastructure and favorable location for the use of Vale's ore
- ✓ Domestic demand for iron ore metalics and/or well positioned to supply external markets

160
kton/year H2

Potential H2 consumption for each new HBI plant

THE ENERGY TRANSITION REQUIRES A MULTIFACETED APPROACH



Decarbonization challenges

- Singularity of each operation or asset
- Very few off-the-shelf solutions are available, and even fewer are suitable for our current and future operations.
- In addition to the technological challenge, the availability of supply for these solutions (equipment and inputs) poses a challenge.
- Infrastructure for a new market.



The transition to low-carbon solutions is a challenge best faced together with our clients, suppliers, and partners



Low carbon H₂ is key to decarbonization of hard-to-abate sectors such as heavy haul transportation and steelmaking. Vale can be an enabler of the H₂ industry due to our energy transition goals.



VALE