

# Vale ESG Webinar

## *Climate Change*

Eduardo Bartolomeo, CEO

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*June 24, 2021*



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Disclaimer

# Vale has made **bold commitments** to mitigate climate change

Leading the transition towards low carbon mining based on our net zero strategy

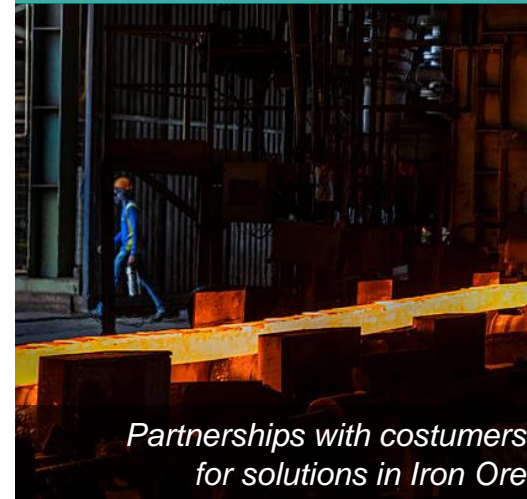
Reduce  
scope 1 and 2 emissions by  
**33% by 2030**



**100% renewable electricity**  
in Brazil (2025)  
and globally (2030)



Reduce  
net scope 3 emissions  
by **15% in 2035**



**Net zero**  
scope 1 and 2 emissions by  
2050



# We are in a unique position to deliver them

## Vale's competitive advantages

### High-quality portfolio

Supporting steel decarbonization and powering the energy transition



### Leader in renewable energy

~90% renewable electricity globally in 2020



### Sustainable mining

1 million hectares of forests protected, ~80% in the Amazon



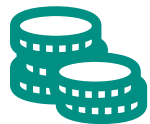
# For that, we have **a strong governance** in place



Board of Directors and Sustainability Committee:  
**Strategic oversight and support**



Low Carbon Forum:  
**C-level monthly meetings to track performance and ensure delivery**



Climate-aligned executive incentives:  
**Climate-related compensation: 5% of short-term (out of 10% related to Sustainability) and 6% of long-term compensation (out of 20% ESG-related)**



# **Vale's road towards net zero mining**

*Maria Luiza Pinto e Paiva, Sustainability VP*

# How will Vale reach net zero by 2050?



## Prioritization of operational emission reductions

- Continuously reduce scopes 1 and 2 emissions through innovative processes, technologies and partnerships



## Nature-based solutions with socioenvironmental co-benefits

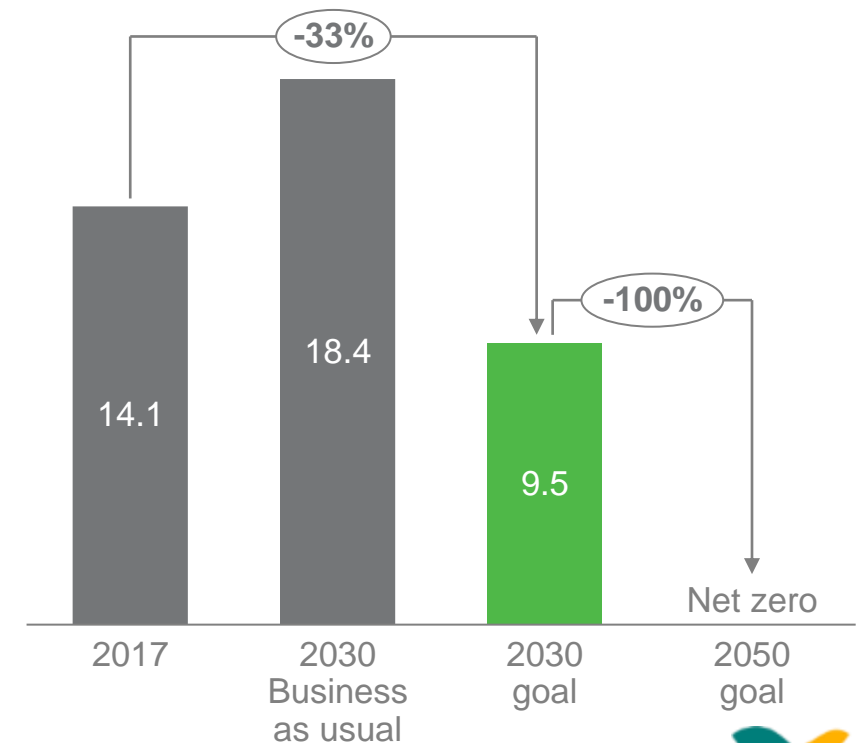
- Vale differentials – Fundo Vale forestry expertise, leveraging on Brazilian and Indonesian local opportunities
- Portfolio based on cost x benefit of different forestry types



## High-integrity carbon markets

- Guarantee of additionality and permanence
- Positive socioenvironmental impact, contributing to SDGs
- Careful accountability based on international best practices
- Transparency on credits used and projects supported

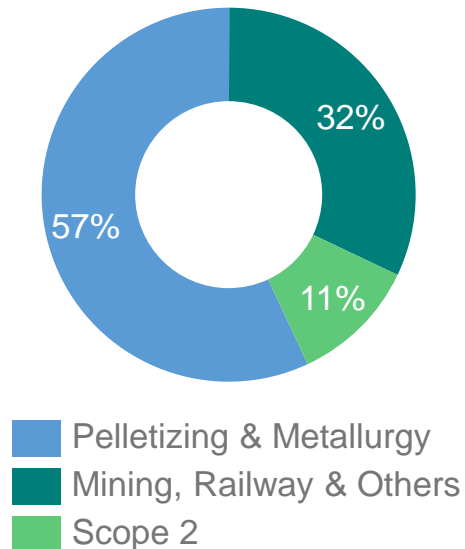
Scope 1 and 2 absolute emissions  
(Mt CO<sub>2</sub> eq.)



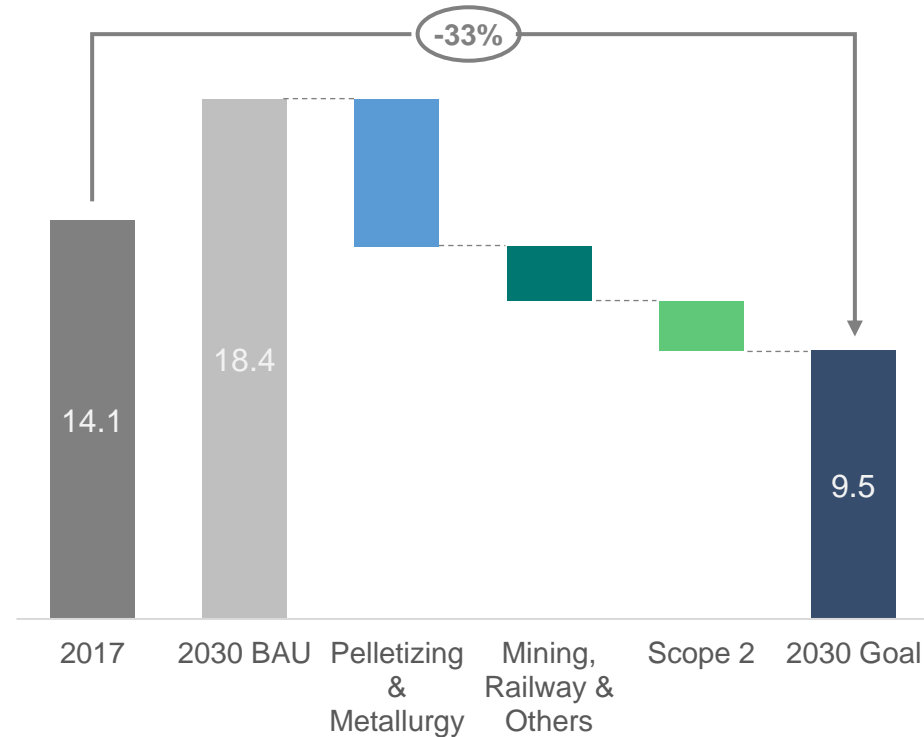
<sup>1</sup> Baseline 2017.

# We have a path to deliver our Scopes 1 & 2 emission reduction targets by 2030





Scope 1 and 2 emissions by process – BAU<sup>1</sup> (%)



Target to reduce 33%<sup>1</sup> of scope 1 and 2 absolute emissions by 2030 (Mt CO<sub>2</sub> eq.)



Main technological routes to drive decarbonization

-  Energy efficiency and renewables
-  Bioenergy
-  Electrification
-  New processes

<sup>1</sup> Baseline 2017. BAU stands for business as usual.



# We are leading with our **PowerShift** and renewable power projects for Scopes 1 & 2

## Electricity

11% of Vale's emissions



- *Folha Larga Sul* wind project
  - 45 MWm for Vale's operations (minimum)
  - Long-term energy supply contract
  - Power cost cut up to US\$ 15 million/year
- *Sol do Cerrado* solar project
  - 193 MWm for Vale's operations
  - US\$ 500 million investment, start-up Oct/22
  - Power cost cut by US\$ 70 million/year

## Mining and logistics

32% of Vale's emissions



- Conveyors to replace haul trucks for long distances
- 30 BEVs operating underground in Canada, with 40+ by the end of 2021
- Piloting electric shunting locomotive at Northern operations
- Partnerships (suppliers/peers) such as the "Charge On" challenge for electrical trucks charging system

## Processing: metallurgy & pelletizing

57% of Vale's emissions



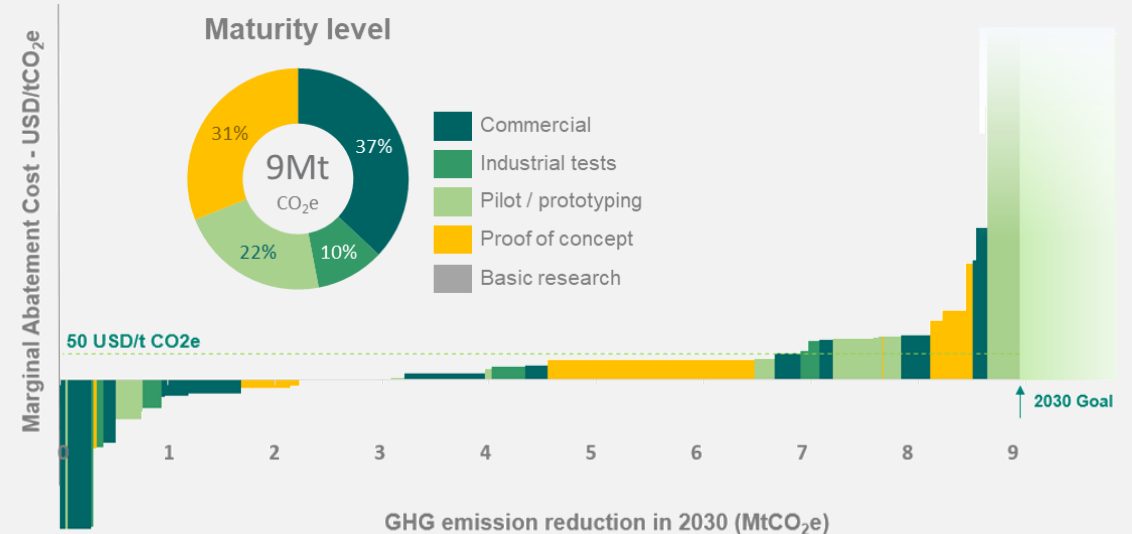
- Continuity of bioenergy industrial tests and developments in our pelletizing plants
- New processes such as in innovative iron ore products (agglomerates)

<sup>1</sup>Source: Casa dos Ventos. Note: In accordance with the 2021 Scope 1&2 Roadmap (annually reviewed). Baseline 2017

# We are relying on robust tools to align our capital allocation

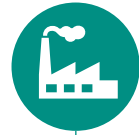
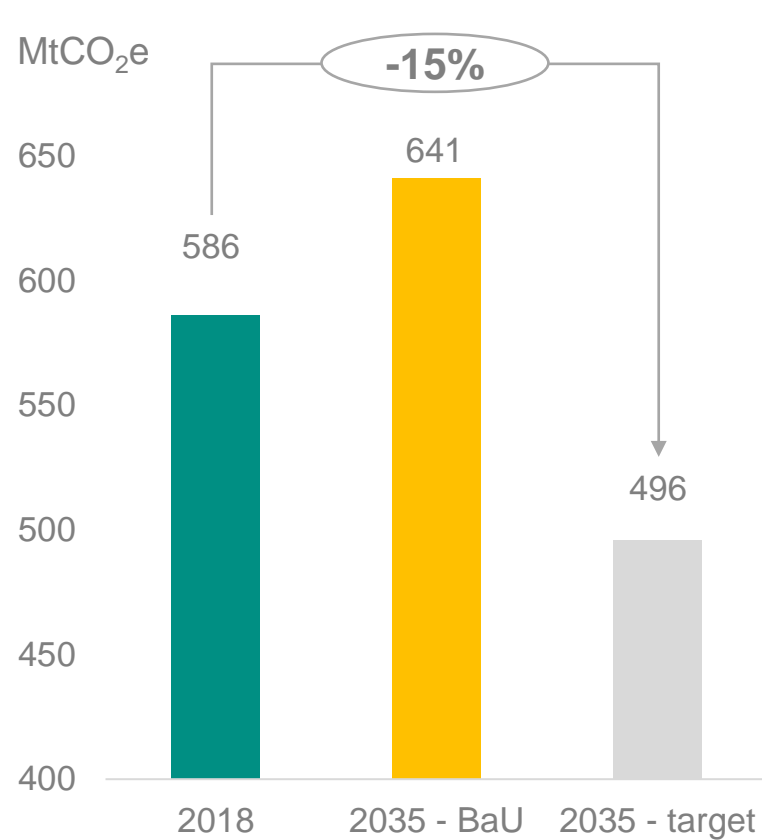
- **US\$ 4-6 billion investment by 2030** for GHG reduction
- **US\$ 50/tCO<sub>2</sub>e** shadow price for all capital allocation decisions
- **Portfolio of GHG reduction opportunities:** marginal abatement cost curve updated on an annual basis, in order to prioritize most cost-efficient projects to pilot and scale up
- **~80% of initiatives mapped are NPV positive<sup>1</sup>** at the considered shadow price, with increased technological maturity due to piloting and studies

## MAC curve highlights – 2021 update



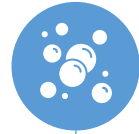
- Increased number of emission reduction initiatives from 30+ in 2020 to 40+ in 2021
- Increased maturity of projects through pilots
- ~50% of commercial entering FEL stage

# We are advancing with our **pioneer scope 3 net emission reduction target**



## ~98% of total emissions associated to our value chain

- Steelmaking (94% of scope 3)
- Shipping (3% of scope 3)



## Vale's own initiatives (15-25%)

- High-quality portfolio and new technological solutions
- Robust and credible carbon offsets



## Partnership and engagement with clients and suppliers (75-85%)

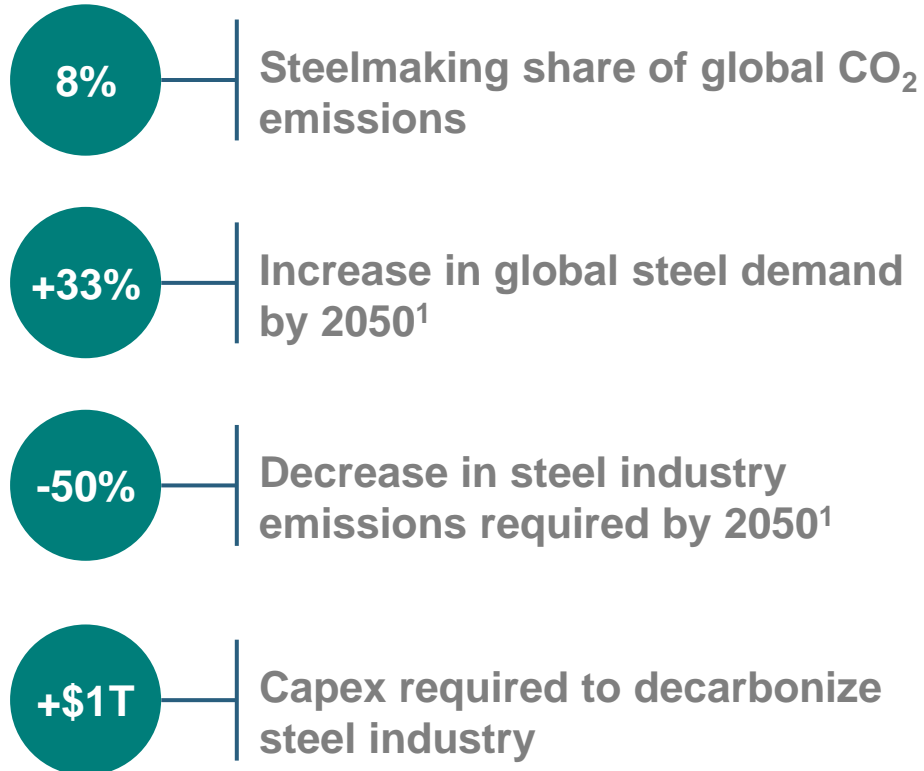
- **Leveraging** steel industry decarbonization
- Supporting a **reduction in shipping emissions** intensity in 40% by 2030 and 50% absolute emissions by 2050 (ref 2008), aligned with the IMO targets
- **EcoShipping program:** open innovation hub to set a pipeline of pilots, with 65+ initiatives identified

2

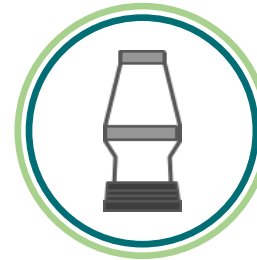
## **Fostering steel decarbonization**

*Rogério Nogueira, Ferrous Marketing Director*

# Steel is produced using two main processes and they have different challenges



## 1 Integrated steelmaking (BF- BOF)



CO<sub>2</sub> restrictions



Aging plants

## 2 Electric Arc Furnace steelmaking (EAF)



Increase of obsolete scrap

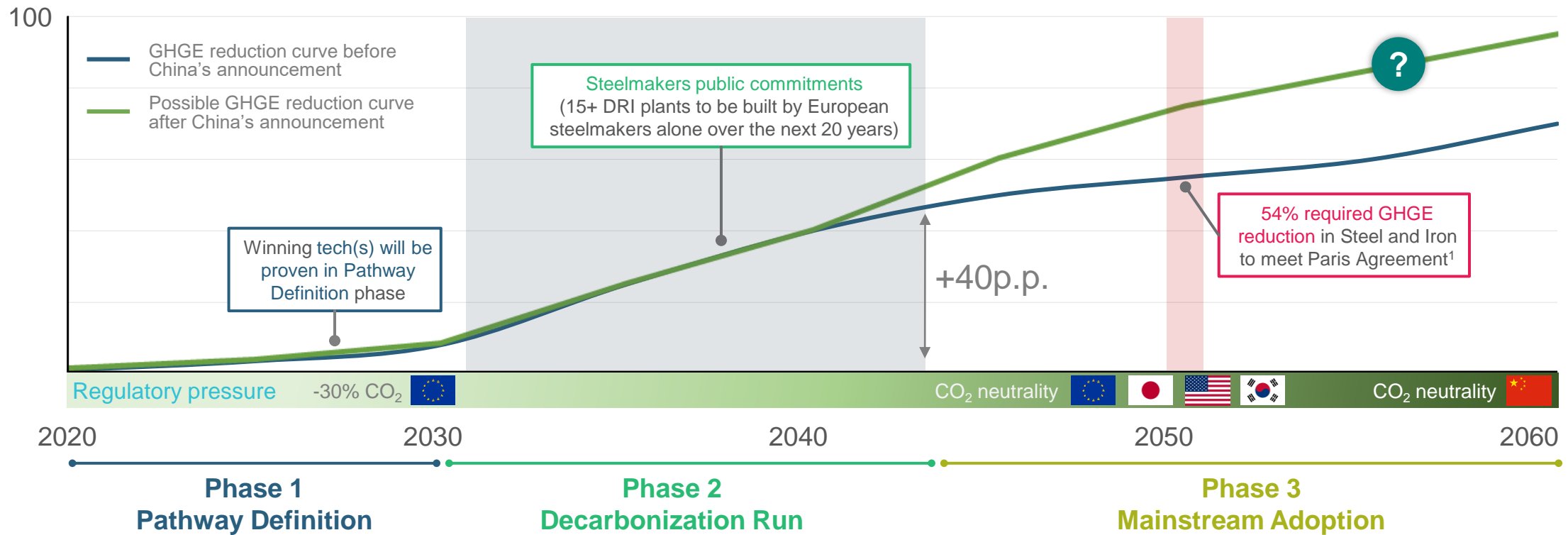


Shift to high quality products

# Steel industry transformation started, strongly driven by GHGE reduction regulations

Illustrative

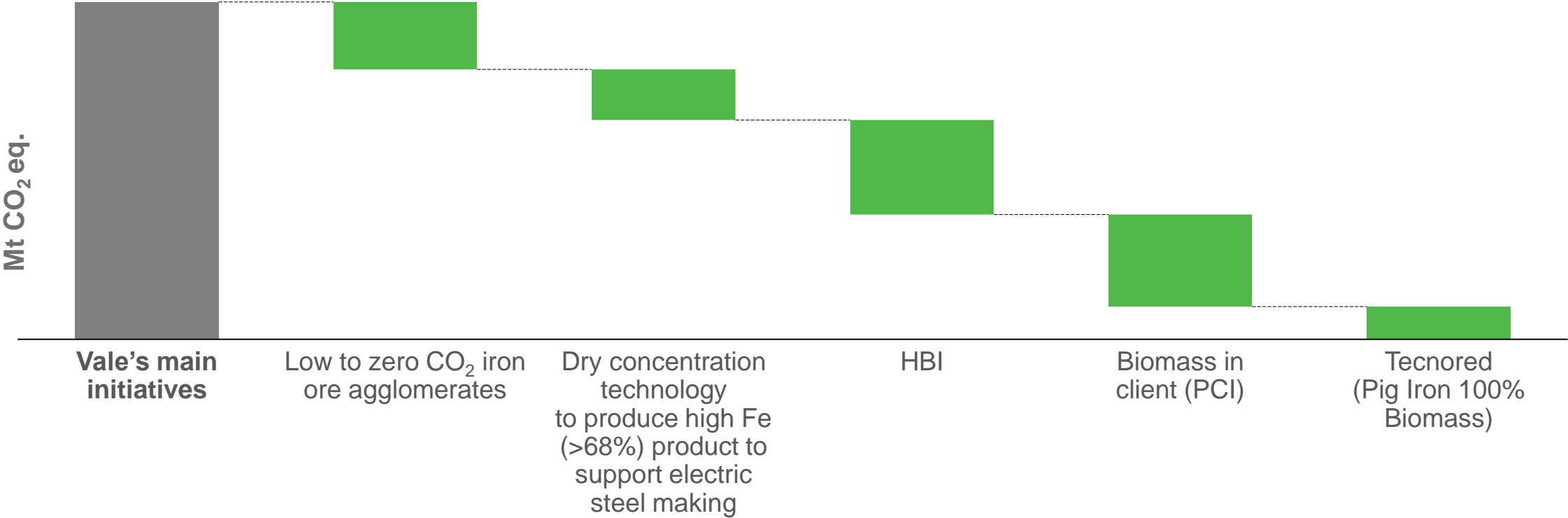
Conceptual view of GHGE reduction in steelmaking  
(100% basis)



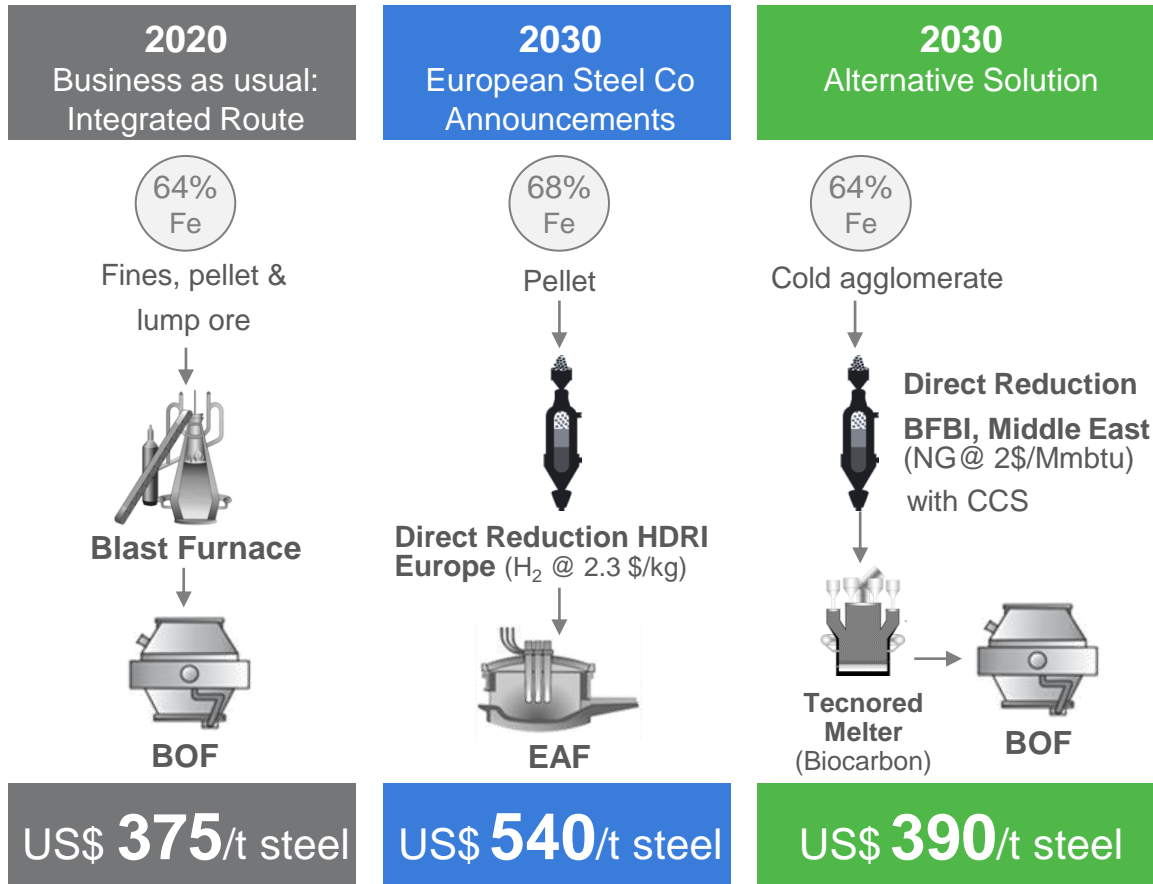
<sup>1</sup> IEA - Iron and Steel Technology Roadmap 2020. Source: BCG Steel Model, BCG Analysis, IEA and Vale analysis.



# Vale's own initiatives to meet its scope 3 emission target

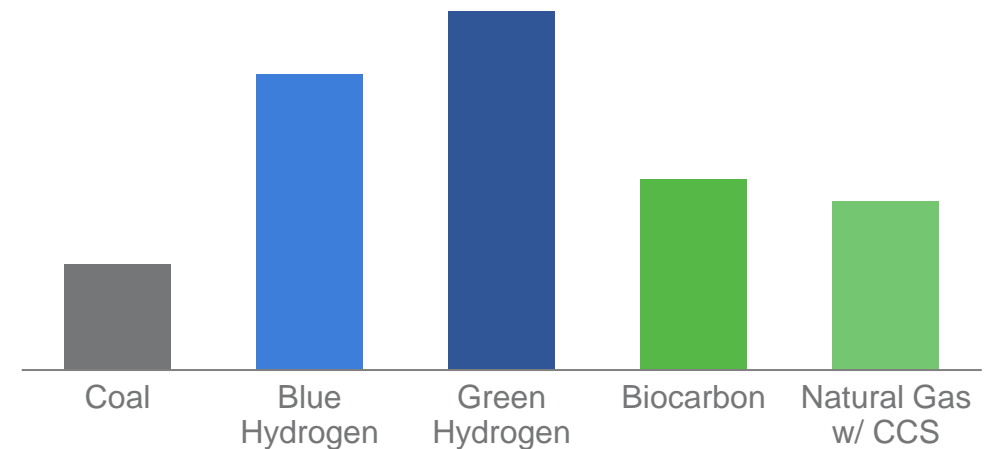


# Decarbonization adds cost, creates pressure for higher productivity and increases VIU of high-grade ores



## Higher fuel costs lead to higher quality premia

Fuel Cost (US\$/ton coal eq.)



Source: Vale Analysis  
 Assumptions: Biochar@\$250/ton; Electricity@\$30/MWh; CCS@\$60/ton.CO<sub>2</sub>



# Vale is naturally well positioned for a market that values high quality and low CO<sub>2</sub> emission products

## Iron ore quality premia will be pushed higher by:



**Higher fuel costs** per ton in ironmaking



**Demand for high productivity**, resulting from bottlenecks in low CO<sub>2</sub> iron production capacity

## Vale will benefit from the decarbonization trend by:

1

Developing **low to zero CO<sub>2</sub> iron ore agglomeration products** for the BFs at an accelerated pace.

2

Using proprietary technology to offer more of the **top-end premium products (>68% Fe)** necessary to the EAF production route.

3

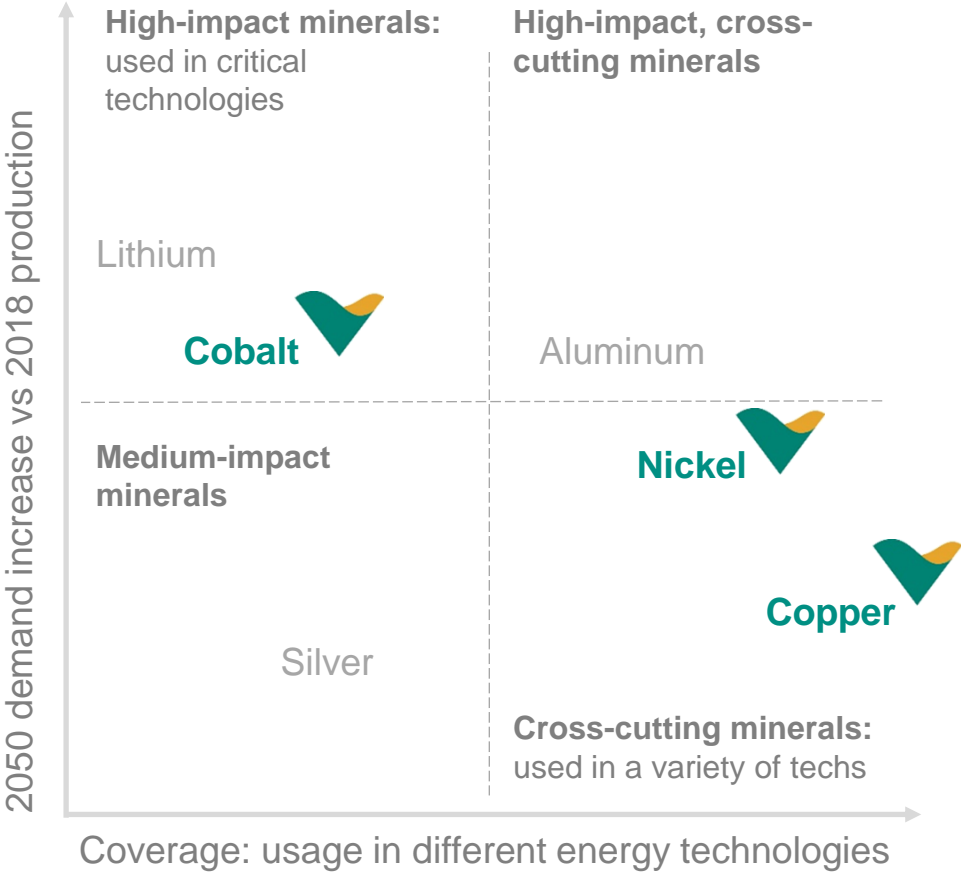
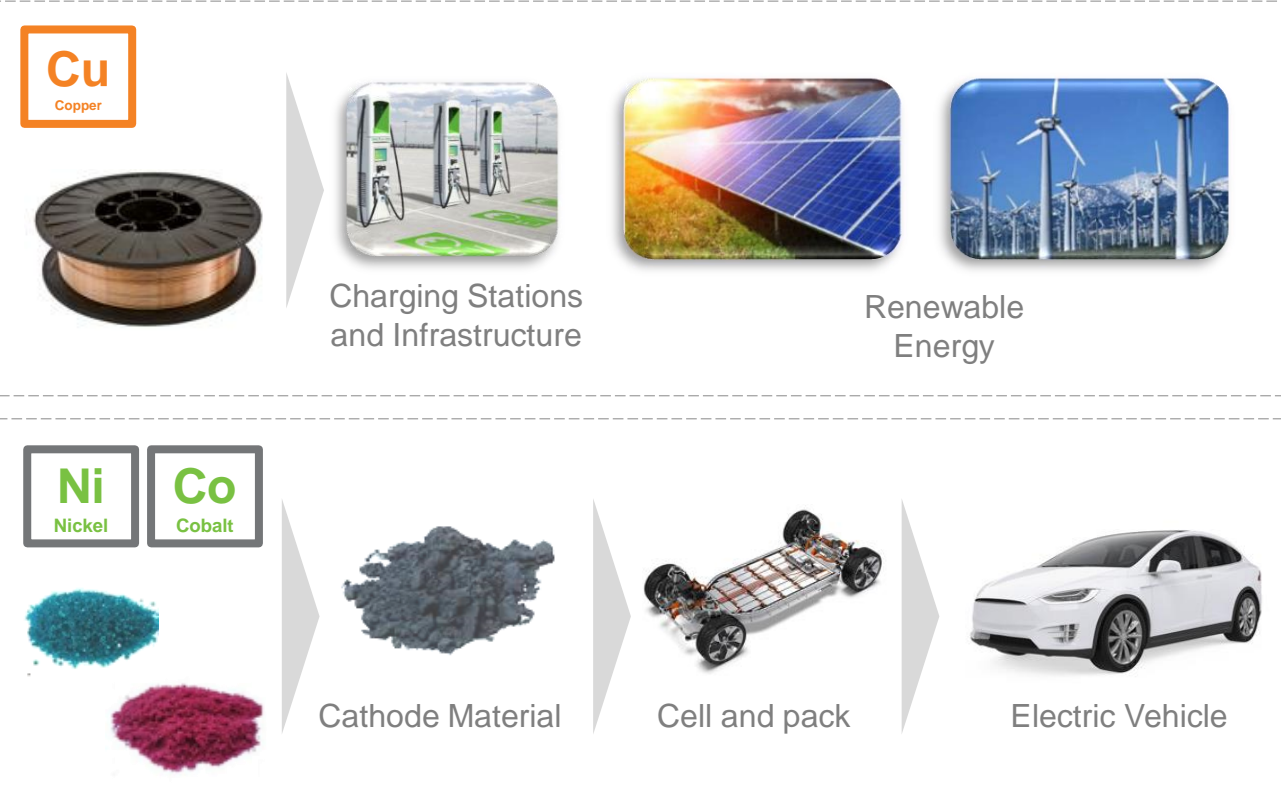
**Establishing, together with partners, an asset-light services** company with rights to use some of the leading technologies to help accelerate the transition away from BFs to lower CO<sub>2</sub> iron-making routes.



**Base Metals powering  
a low carbon economy**

*Mark Travers, Base Metals VP*

# Vale Base Metals' products are critical to **low-carbon technologies**

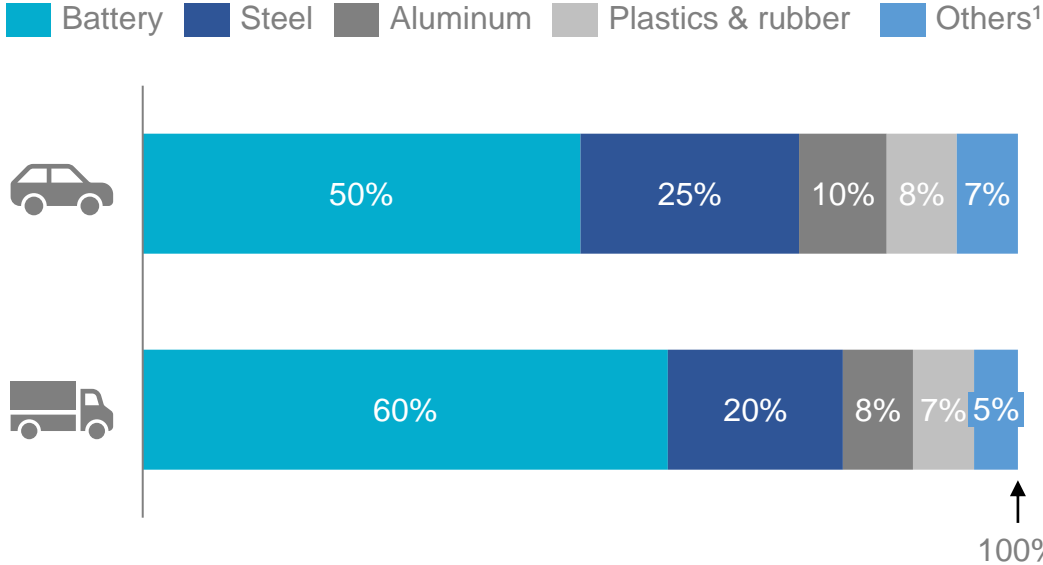


<sup>1</sup> Source: The World Bank.

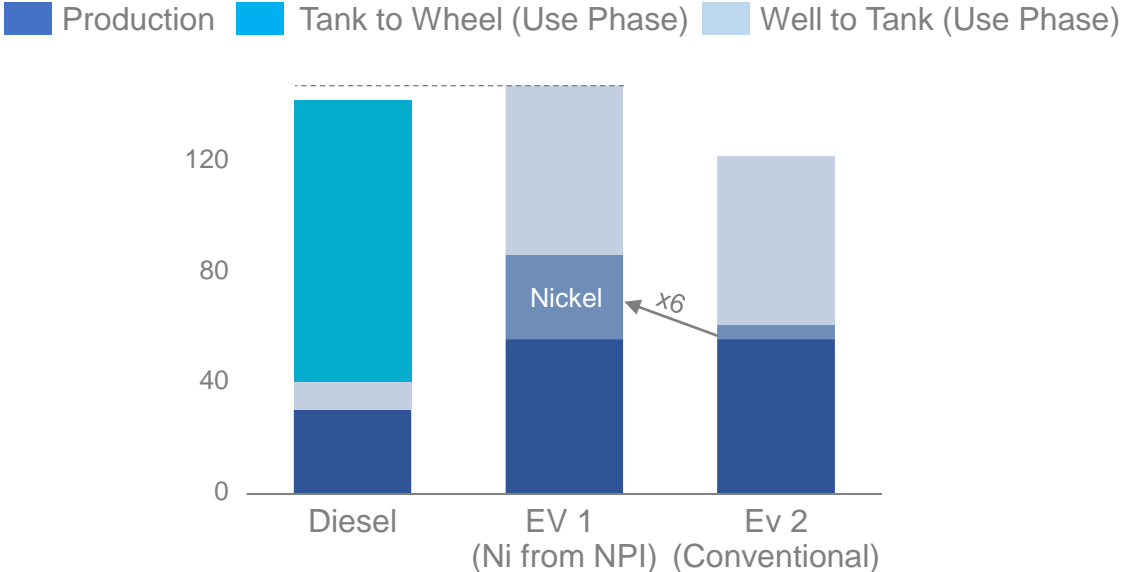


# When it comes to EV, at least half of the carbon footprint comes from the **battery** - being **low carbon** is critical for the business

Share of Emissions<sup>1</sup> by Components (% of Total)



Lifetime CO2 Emissions from Passenger Cars  
Stated as gr. CO2/km



<sup>1</sup> Source: McKinsey, Trafigura. Including all upstream emissions from raw material extraction to the OEM, including logistics. <sup>2</sup>Including e.g. glass, copper, electronics, textiles, logistics.

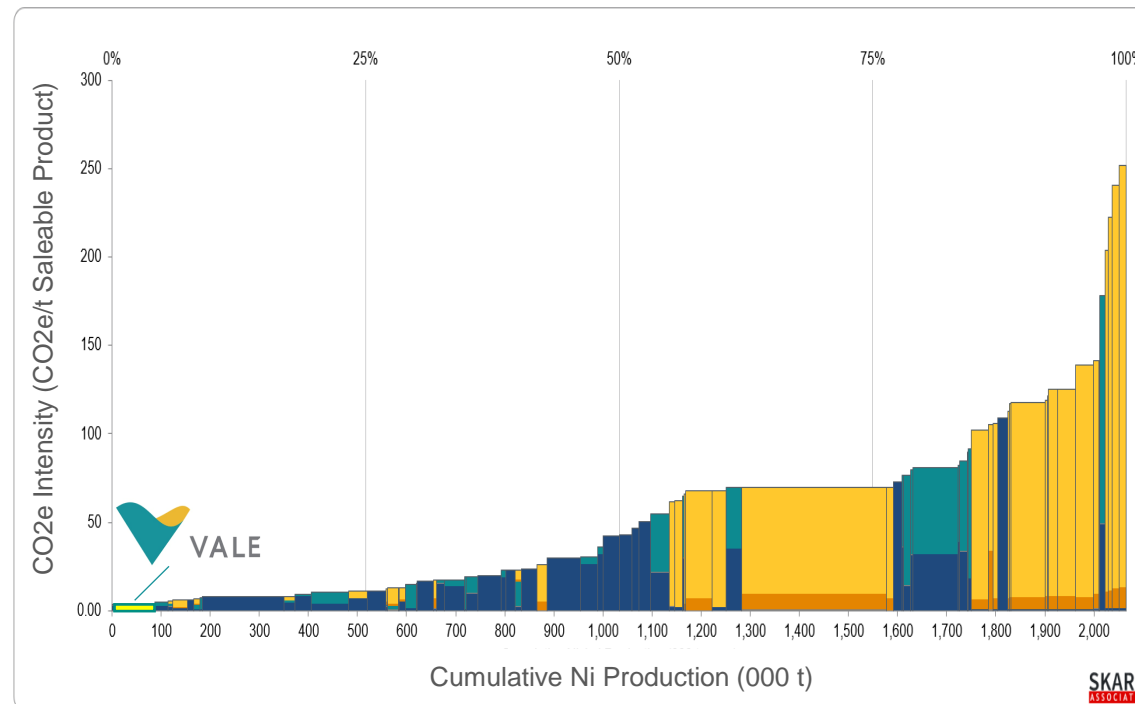


# We have taken a **strategic positioning** in this market...

## First movers...

- Long-term off-take agreement signed with major North Atlantic EV Producer
- Recycling EV batteries (Black mass)
- Alternative routes and products for EV industry

## ... and lower carbon



© Skarn Associates Limited

## Vale Class 1 Nickel products:

- Among the **lowest carbon intensive**

## Voisey's Bay

- High-grade open pit mine, transitioning to underground mine, +15-year life and exploration potential
- Substituting diesel for electricity by wind and potential transmission line

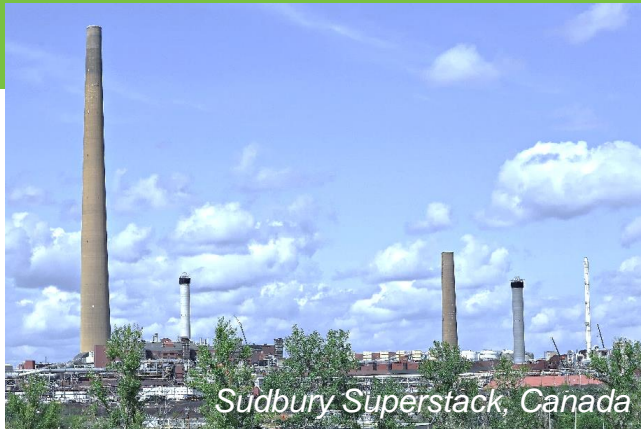
## Long Harbour Processing Plant

- Hydrometallurgy processing plant with benchmark nickel and cobalt refining technology



# ... with sustainable operations

## We have already done



*Sudbury Superstack, Canada*

### Copper Cliff Smelter in Sudbury

- US\$ 1.5 bn investment
- Reduction in emissions
  - ✓ 40% GHG from the smelter
  - ✓ 85% sulphur dioxide
  - ✓ 40% metals particulate

## We are evolving...



*Coleman Mine, Canada*

### Underground electric vehicles

- 30 BEVs operating underground
- 40+ by the end of 2021
  - ✓ Reduces diesel exhausts and particulates
  - ✓ Reduces underground heat and noise

## ...and we will deliver



*Sorowako, Indonesia*

### Base Metals Low Carbon Agenda

- Decarbonization of the RKEFs
- Clean energy electrification
- Use of biofuels and biomass
- Scope 3 reduction roadmap



**At Vale,  
we're changing how we mine  
to serve a changing world**

*Aerial view from S11D  
Operational Control Center,  
(Carajás, PA)*



VALE