"This presentation may include statements about Vale’s current expectations about future events or results (forward-looking statements). Many of those forward-looking statements can be identified by the use of forward-looking words such as “anticipate,” “believe,” “could,” “expect,” “should,” “plan,” “intend,” “estimate” “will” and “potential,” among others. All forward-looking statements involve various risks and uncertainties. Vale cannot guarantee that these statements will prove correct. These risks and uncertainties include, among others, factors related to: (a) the countries where Vale operates, 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. Vale cautions you that actual results may differ materially from the plans, objectives, expectations, estimates and intentions expressed in this presentation. Vale undertakes no obligation to publicly update or revise any forward-looking statement, whether as a result of new information or future events or for any other reason. To obtain further information on factors that may lead to results different from those forecast by Vale, please consult the reports that Vale files with the U.S. Securities and Exchange Commission (SEC), the Brazilian Comissão de Valores Mobiliários (CVM), the French Autorité des Marchés Financiers (AMF) 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.

The information contained in this presentation includes financial measures that are not prepared in accordance with IFRS. These non-IFRS measures differ from the most directly comparable measures determined under IFRS, but we have not presented a reconciliation to the most directly comparable IFRS measures, because the non-IFRS measures are forward-looking and a reconciliation cannot be prepared without unreasonable efforts."
Vale will generate **more value** for shareholders than its global mining peers

Vale Day 2017

Source: Bloomberg, last updated on December 3rd, 2018.
Lower winter cuts = Lower steel prices in the short term

- c.30% in 2017
- c.20% in 2018

Global average HRC prices, in US$/t

Source: Bloomberg, last updated on December 3rd, 2018.
Iron ore is trading within the expected price range.
Sustainability
Leading the future in Iron Ore
Unlocking value in Coal
Value and optionality in Base Metals
Rewards of the strategy
Sustainability
Vale: becoming a **reference in sustainability**...

**Efficient and sustainable mining**
- S11D
- Truckless
- Dry processing
- Mining 4.0

**Quality products**
- High grade iron ore with less CO₂ emissions
- Nickel and cobalt for EV batteries

**Engagement with society**
- Positive social legacy
- Forest reserve and reforestation
- Health & Safety
...with recognition for its ongoing commitment

Top 3 out of 40+ companies in the extractive industry
World Corporate Human Rights Benchmark 2018

7 consecutive years UN Global Compact LEAD
Only ranked company from the Metals & Mining sector

ISE Included in the 2019 Corporate Sustainability Index of the Brazilian Stock Exchange
Renova Foundation has invested US$ 1.3 billion in environmental and social programs.

<table>
<thead>
<tr>
<th>Environment recovery</th>
<th>Resettlement</th>
<th>Indemnification</th>
</tr>
</thead>
<tbody>
<tr>
<td>113 tributaries rehabilitated</td>
<td>400+ families</td>
<td>25,000 people financial aid</td>
</tr>
<tr>
<td>800 hectares reforested</td>
<td></td>
<td>US$ 350 million compensation</td>
</tr>
</tbody>
</table>

*Until October 2018, FX BRL/USD of 3.50.*
Our vision for the future starts now with ambitious goals to be achieved by 2030

- **Energy**: 100% self-generation of clean energy in Brazil
- **Forest**: Recover 100,000 ha of degraded land beyond our fences
- **Water**: Reduce new water collection by 10%
- **Climate change**: Reduce greenhouse gas emissions by 16%
- **Socioeconomic contribution**: Health care, education and income generation
Leading the future in Iron Ore
Flight to quality is definitive, structural and global
Vale is the main supplier of green ore

High grade vs. low grade ore¹

<table>
<thead>
<tr>
<th>Particulate emissions</th>
<th>CO₂ emissions</th>
<th>NOₓ emissions</th>
<th>SO₂ emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>-17%</td>
<td>-16%</td>
<td>-10%</td>
<td>-8%</td>
</tr>
</tbody>
</table>

High grade vs. low grade ore¹

<table>
<thead>
<tr>
<th>Particulate emissions</th>
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<th>NOₓ emissions</th>
<th>SO₂ emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>-17%</td>
<td>-16%</td>
<td>-10%</td>
<td>-8%</td>
</tr>
</tbody>
</table>

¹ Vale's high grade ore average (63.4%) vs. low grade (58%).
Quality imbalance supports the flight to quality

Credits: left side picture by Dario Zalis/Vale
Strong steel demand along with capacity cuts has required higher productivity...

World capacity utilization, in %

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>70%</td>
</tr>
<tr>
<td>2016</td>
<td>70%</td>
</tr>
<tr>
<td>2017</td>
<td>73%</td>
</tr>
<tr>
<td>2018 YTD</td>
<td>76%</td>
</tr>
</tbody>
</table>

Source: WSA. From August/2018, WSA stopped reporting capacity utilization figures, since then it is based on OECD capacity figures. Last updated with October/2018 data.
...also resulting in **higher steel prices** on a worldwide basis

**Global average HRC prices, in US$/t**

- **Monthly data**
- **Yearly average**

<table>
<thead>
<tr>
<th>Year</th>
<th>Monthly Data</th>
<th>Yearly Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-15</td>
<td>411</td>
<td></td>
</tr>
<tr>
<td>Jan-16</td>
<td>462</td>
<td>595</td>
</tr>
<tr>
<td>Jan-17</td>
<td>595</td>
<td>707</td>
</tr>
<tr>
<td>Jan-18</td>
<td>707</td>
<td></td>
</tr>
</tbody>
</table>

Source: Bloomberg, HRC Prices for China, USA and North Europe. Last updated on December 3rd, 2018.
Pellet demand will grow significantly, creating **value accretive opportunities**

**Main market opportunities**

- Middle East and Africa (direct reduction)
- China (blast furnace)
- Europe and others (blast furnace and alternative technologies)

---

**Pellet demand¹, in Mt**

<table>
<thead>
<tr>
<th>Year</th>
<th>Seaborne</th>
<th>+33%</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-17</td>
<td>452</td>
<td></td>
<td>514</td>
</tr>
<tr>
<td>2018</td>
<td>514</td>
<td></td>
<td>602</td>
</tr>
<tr>
<td>2025E</td>
<td>602</td>
<td></td>
<td>602</td>
</tr>
</tbody>
</table>

¹ Source: CRU and Vale estimates.
Planned replacement of Australian ore *amplifies quality-wise supply imbalance*...

<table>
<thead>
<tr>
<th>Tonnage depletion until 2025</th>
<th>Additions until 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>227 Mt¹</td>
<td>251 Mt¹</td>
</tr>
<tr>
<td>0.075%</td>
<td>0.095%</td>
</tr>
<tr>
<td>0.41%</td>
<td>0.51%</td>
</tr>
</tbody>
</table>

¹ Seaborne excluding Brazil.

Source: Vale database, info is based on marketing rounds with technical consultants.
...resulting in an increase in alumina differentials over time

Alumina differential for 1.0% to 2.5%, in US$ per %¹

<table>
<thead>
<tr>
<th>Year</th>
<th>Alumina Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>0.34</td>
</tr>
<tr>
<td>1H17</td>
<td>0.67</td>
</tr>
<tr>
<td>2H17</td>
<td>1.78</td>
</tr>
<tr>
<td>1H18</td>
<td>2.82</td>
</tr>
<tr>
<td>2H18</td>
<td>6.94</td>
</tr>
</tbody>
</table>

¹ Source: Platts, last updated on November 21st, 2018.

Products differential to the 62% Fe, in US$ per ton²

<table>
<thead>
<tr>
<th>Month</th>
<th>BRBF</th>
<th>Jimblebar</th>
<th>MAC</th>
<th>Pilbara</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec-17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr-18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug-18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

² Source: Argus, last updated on November 22nd, 2018.
Vale has **successfully** implemented a **differentiation strategy**

- **IOCJ**: Market reference for high grade sinter feed
- **Pellets**: Comprehensive portfolio of pellets suited to all market needs
- **BRBF**: Market reference for low alumina sinter feed
- **SFLA**: Ultra low alumina high grade sinter feed

Note: Iron Ore Carajás Fines (IOCJ), Brazilian Blend Fines (BRBF) and Sinter Feed Low Alumina (SFLA).
Vale invested US$ 20 billion to be where it is today
S11D consolidated Vale as a premium producer

S11D production volumes, in Mtpy

- 2017: 22 Mtpy
- 2018E: ~55 Mtpy
- 2019E: 70 - 80 Mtpy
- 2020E: 90 Mtpy

Investments totaling US$ 14.3 bi
Itabiritos projects also improved quality...

Itabiritos projects volume, in Mtpy

- Sinter feed (65.8% Fe)
- Pellet feed (68.6% Fe)

Investments totaling US$ 4.8 bi
...and enabled the **pellet production increase**

**Installed pellet capacity, in Mtpy**

<table>
<thead>
<tr>
<th>Year</th>
<th>Tubarão I / II / VIII</th>
<th>São Luís</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>44</td>
<td>14</td>
<td>8</td>
</tr>
</tbody>
</table>

Investments totaling US$ 1.4 bi
Supply chain: complexity turned into flexibility

4 integrated production systems in Brazil
- 22 mines
- 3 railroads and 1 waterway
- 4 loading ports

13 pelletizing plants
- 11 in Brazil
- 2 in Oman

17 blending sites
- 1 in Malaysia
- 16 in China
Partnerships in China: key for flexibility

16 ports in China
Vale invested over US$ 20 bi in **premium products**

Share of premium products¹, in %

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018E</th>
</tr>
</thead>
<tbody>
<tr>
<td>53%</td>
<td>81%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Premium products: Pellets, IOCJ, BRBF, pellet feed and SFLA.
High return brownfields and bolt-on acquisition

Northern System
240 Mt

Gelado pellet feed
recovery

Southeastern System
20 Mt pellet
feed

Ferrous
acquisition

Oman pellets
expansion

Malaysia DC
expansion

Share of premium products¹, in %


53% 81% 95%

¹ Premium products: Pellets, IOCJ, BRBF, pellet feed and SFLA.
Vale is building its future by expanding S11D to 100 Mt and Northern System logistics to 240 Mt...

- Capex of ~US$ 770 million
- Start-up 2022
- Reduction in Vale’s average C1 cost
- Increase in price realization

- Capex of ~US$ 770 million
- Start-up 2022
- Reduction in Vale’s average C1 cost
- Increase in price realization
...transforming tailings into high Fe content products (Gelado project)...

- High quality product
- Start-up 2H21
- Up to 10 Mtpy of pellet feed
- Net investments¹ ~US$ 270 million
- C1 cost US$ 3.5/t lower than Northern System average²

¹ Considers US$ 160 million of avoided sustaining investment.
² Carajás (Northern range), excluding S11D.
...increasing high grade/low alumina pellet feed production in the Southeastern System...

Pellet feed production, in Mtpy

- 2020: 2 Mtpy
- 2021: 1 Mtpy
- 2022: 3 Mtpy
- 2023: 5 Mtpy
- Long term: 20 Mtpy

**Investments**
- US$ 820 million in 5 years

**Process optimization**
- Fe content reduction in tailings

**Recovery & concentration of tailings**
...further enhancing high grade pellet feed capacity through bolt-on acquisitions (Ferrous)... 

- ~4 Mtpy pellet feed
- Potential for direct reduction quality
- Increase Southern System quality
- Supply chain cost reductions
- US$ 550 million

Note: Subject to closing conditions and statutory/regulatory approvals.
...expanding the **production of direct reduction** pellets in Oman...

- Capex US$ ~30 million
- Start-up 2H20
- +2 Mtpy
- Boosting productivity in using IOCJ
- Strengthening presence in the Middle East
...and expanding Vale’s Malaysia distribution center to **reach new markets and reduce costs**

- **Additional 10 Mtpy**
- **Start-up 1H22**
- **Cost reduction**
- **Capex of ~US$ 130 million**
- **New markets in Southeast Asia / India**
Vale consolidates its **leadership** and its **value over volume approach**

**Share of premium products**, in %

- **81%** in 2018E
- **95%** in 2022E

**Main premium products:**
- Pellets
- Iron Ore Carajás Fines (IOCJ)
- Brazilian Blend Fines (BRBF)
- Pellet feed
- Sinter Feed Low Alumina (SFLA)

**Iron ore production volumes**, in MtPY:

- **~390** in 2018E
- **~400** in 2019E and 2023E
- **~400** in 2020E
- **~400** in 2021E

1. **Premium products:** Pellets, IOCJ, BRBF, pellet feed and SFLA.
2. Including third party purchases, run-of-mine and feed for pelletizing plant.
Vale: competitive beyond quality
C1 costs to reduce further: S11D ramp-up and productivity (technological initiatives & cost management)

Gains, in US$/t

<table>
<thead>
<tr>
<th></th>
<th>2018E</th>
<th>2019E - 2023E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 - 2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2 - 3.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Based on 2H18 numbers, IODEX 62% Fe of US$ 68.0/t, FX BRL/USD of 3.96 and bunker prices of US$ 466.0/t.
Secured long term contracts support Vale’s freight competitiveness

Volumes, in Mtpy

- **Guaibamax**
- **Valemax 1G and 2G**

<table>
<thead>
<tr>
<th>Year</th>
<th>Guaibamax</th>
<th>Valemax 1G and 2G</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018E</td>
<td>65-70</td>
<td></td>
</tr>
<tr>
<td>2019E</td>
<td>90-100</td>
<td></td>
</tr>
<tr>
<td>2020E</td>
<td>25-30</td>
<td>105-115</td>
</tr>
<tr>
<td>2021E</td>
<td>25-30</td>
<td>105-115</td>
</tr>
<tr>
<td>2022E</td>
<td>25-30</td>
<td>105-115</td>
</tr>
<tr>
<td>2023E</td>
<td>25-30</td>
<td>105-115</td>
</tr>
</tbody>
</table>

**Valemax 1G**
- 35 operating

**Valemax 2G**
- 18/32 operating
- 47 Guaibamax under construction
Vale is ahead of compliance with the new IMO regulation while obtaining a net freight reduction.

<table>
<thead>
<tr>
<th>US$/t</th>
<th>Freight cost 2018E</th>
<th>Maritime diesel adjustment¹</th>
<th>Valemax 2G and Guaíbamax²</th>
<th>Scrubbers³</th>
<th>Other initiatives</th>
<th>Freight cost 2023E</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.3</td>
<td>3.6</td>
<td>2.0</td>
<td>1.8</td>
<td>0.4</td>
<td></td>
<td>17.7</td>
</tr>
</tbody>
</table>

¹ Based on ~US$ 190/t spread between 2023 low sulphur and 2018 high sulphur.
² Based on ~110 Mt new shipping capacity for Valemax 2G and Guaíbamax.
³ Vessels with scrubbers will still be allowed to consume High Sulphur Fuel Oil.
Commercial initiatives will continue to boost price realization on top of a better product mix.
Competitiveness initiatives will increase Ferrous Minerals EBITDA up to US$ 5.0/t by 2023...

EBITDA/t gains by 2023E, in US$/t

- **C1 (S11D and productivity):** 1.0 - 2.0
- **Supply chain and price realization**: 2.5 - 3.0
- **Total 2023E**: 3.5 - 5.0

The US$ 3.5 - 5.0/t gain will come on top of the US$ 3.0/t already captured in 2017 and 2018

¹ Includes freight.
...translating into a total annual Ferrous Minerals EBITDA/t of up to US$ 47 by 2023.

Normalized EBITDA/t (price, FX and bunker), in US$/t

Note: Based on 2H18 numbers: IODEX 62% Fe of US$ 68.0/t, FX BRL/USD of 3.96 and bunker prices of US$ 466.0/t.
Unlocking value in Coal
The conclusion of Moatize ramp-up is based on **three pillars**...

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Mine productivity</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Infrastructure</td>
<td>• Knowledge transfer to local workforce</td>
<td>• Buffer stockpile</td>
</tr>
<tr>
<td>• Mine equipment</td>
<td>• Maintenance department restructuring</td>
<td>• Interconnection of the 2 plants</td>
</tr>
<tr>
<td>• Development of new mining sections</td>
<td></td>
<td>• Equipment debottlenecking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Process control</td>
</tr>
</tbody>
</table>

In parallel, an **extensive complementary drilling program** is being carried out.
...which create the basis for a *sustainable and reliable* ramp-up...
...leading to a significant **cost reduction**

The diagram illustrates the pro forma cost, in US$/t, from 2018E to 2023E, breaking down the costs into Net Nacala tariff and pro-forma operational costs.

1. Composed of investments, working capital, debt service, amortization, taxes and others, net of interest received by Vale related to shareholder loans.
2. Includes mine, plant, railway and port, excluding royalties.
Value and optionality in Base Metals
Challenge

Complete Nickel turnaround before EVs become a reality
Batteries for EVs will be a key nickel demand driver

Using NCM 811 chemistry

43 kg x 12 million ΔEVs over 500 kt additional high-quality Ni demand in 2025

Number of EVs, in million

1 Includes Plug-in Hybrid Electric Vehicle (PHEV) and Battery Electric Vehicle (BEV).
Source: Public announcements, media, Vale analysis.
Vale is supporting VNC based on the prospects for the EV revolution
Vale reached an agreement with Glencore to jointly explore Vale’s Victor orebody and Glencore’s Nickel Rim South.
Competitiveness
Vale’s global nickel footprint offers unique opportunities in the future.
Nickel turnaround is based on **three key pillars**

- Supply chain integration
- Operational excellence
- Digital transformation
Nickel turnaround – main focus in Sudbury

- Flowsheet optimization
- Cost reduction program
- Improve underground mine performance
- Long Harbour ramp-up

Canadian operations

PTVI

VNC
Stabilizing and enhancing Canadian operations yield opportunities

Potential cost reduction
US$ 140 million in 2019

Revision of contracts with suppliers
US$ 80 million

Matrix cost management
US$ 20 million

Revision of maintenance processes
US$ 20 million

Process optimization
US$ 10 million

Centralized organizational structure
US$ 10 million
Nickel turnaround

- Truck and mine equipment renewal
- Debottlenecking of our furnaces
- Fuel efficiency – coal conversion
- US$ 80 million in savings in the medium term
Nickel turnaround

- Mine plan revision and new equipment
- Debottlenecking study of the plant
- Ramp-up to 50 ktpy in the medium term
Future growth
The nickel industry will need to keep pace with demand. **Time is running out.**

### Annual supply growth needed, in kt of Ni per year

<table>
<thead>
<tr>
<th></th>
<th>Forecast¹</th>
<th>Historical²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-16</td>
<td>73</td>
<td>100</td>
</tr>
<tr>
<td>2017-23</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2024-30</td>
<td>195</td>
<td></td>
</tr>
</tbody>
</table>

Requires a new 
Sudbury + Voisey’s Bay + PTVI every year

¹ Source: Vale analysis built on Wood Mackenzie, CRU, public announcements, academic papers and conversations with downstream producers.

Vale is able to reach 313 kt in the short term and produce as much as 400 kt in the medium term.
Vale has potential to *increase its* copper production.
Vale has **deep knowledge of the Carajás region**, where it holds most of its copper projects.

**Medium term**
- Salobo III, 30-40 kt
- Cristalino, ~80 kt
- Alemão, ~60-70 kt

**Long term**
- Paulo Afonso
- Polo
- Furnas
- Sossego UG
- Visconde
- Bacaba
- Mata
- 118

**Salobo**

**Alemão**

**Paulo Afonso**

**Polo**

**Furnas**

**Sossego UG**

**Visconde**

**Bacaba**

**Mata**

**118**
Opportunities in **projects** for the **medium and long term**

**Mini-mines Carajás**

- **Cu**: 50-100 kt Cu
- Small deposits operated by third parties
- Located in Carajás
- Operation in the short-term
Opportunities in projects for the medium and long term

- Mini-mines Carajás
- Salobo III

- 30-40 ktpy of copper
- Wheaton Precious Metals US$ 600-700 mi payment
- Net capex US$ 400-500 mi
- Start-up in 2022
Opportunities in projects for the medium and long term

- Mini-mines
  - Carajás
- Salobo III
- Cristalino
- ~80 ktpy of copper
- Maintain Sossego’s plant operating at full capacity
- Start-up in 2023
Opportunities in projects for the medium and long term

- Mini-mines Carajás
- Cristalino
- Salobo III
- Alemão

- ~60-70 ktpy of copper
- High gold by-product content in the concentrate
- Start-up in 2024
Opportunities in projects for the medium and long term

- Mini-mines Carajás
- Cristalino
- Victor
- Salobo III
- Alemão

Best non-developed project in Sudbury
- Cu 30 ktpy
- Ni 11 ktpy
- Start-up in 2025
Opportunities in projects for the medium and long term

Copper deposit in Indonesia

- Mini-mines Carajás
- Cristalino
- Victor
- Salobo III
- Alemão
- Hu’u

Cu: 250-300 ktpy
Au: 260 koz

Potential start-up in 2026
Rewards of the strategy
Ferrous Minerals projects and initiatives will further enhance **portfolio differentiation**

<table>
<thead>
<tr>
<th>Carajás 240 Mtpy</th>
<th>Pellet feed Gelado</th>
<th>Pellet feed Southeastern</th>
<th>Oman</th>
<th>Malaysia</th>
<th>Ferrous acquisition</th>
<th>Competitiveness</th>
</tr>
</thead>
</table>

IRR 20% ~ 80%

*Up to US$ 2.9 billion EBITDA by 2023 @ current prices & premiums*

¹ Considers US$ 160 million of avoided sustaining investment.
Turnaround and EV revolution will be catalysts for growth in Base Metals

<table>
<thead>
<tr>
<th>Turnaround</th>
<th>Ni growth volume</th>
<th>Ni cost reduction</th>
<th>Ni EV revolution price opportunity</th>
<th>Cu growth volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ volume: 80 kt</td>
<td>Volume: 320 kt</td>
<td>Δ price: US$ 7,000/t</td>
<td>Δ volume: 80 kt</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Current margin:</td>
<td>Δ cost/t</td>
<td>Volume: 320 kt</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>US$ 6,400/t</td>
<td>US$ 2,600/t</td>
<td>Current margin: US$ 3,900/t</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>=</td>
<td>=</td>
<td>Δ EBITDA: US$ 830 mi</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>Δ EBITDA: US$ 510 m</td>
<td>Δ EBITDA: US$ 830 mi</td>
<td>Δ EBITDA: US$ 2.2 bi</td>
<td>Δ EBITDA: US$ 310 m</td>
<td></td>
</tr>
</tbody>
</table>

US$ 3.9 billion EBITDA opportunity by 2023
We have other EBITDA and Cash Flow opportunities

<table>
<thead>
<tr>
<th>Moatize ramp-up higher volume</th>
<th>Moatize ramp-up cost reduction</th>
<th>Zero pre-operating expenses</th>
<th>Gross debt reduction</th>
<th>Liability management</th>
<th>MBR buyback</th>
<th>Samarco cash outflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ volume: 8 Mt</td>
<td>Volume: 20 Mt</td>
<td>Δ cost: US$ 42/t</td>
<td>Δ gross debt: US$ 2 bi</td>
<td>Δ interest rate: 2.6%</td>
<td>Δ interest rate: 0.5%</td>
<td>US$ 170 mi dividends paid in 2018</td>
</tr>
<tr>
<td>x Current margin²: US$ 15/t</td>
<td>x Δ EBITDA: US$ 120 mi</td>
<td></td>
<td>x Δ interest rate: =</td>
<td>Δ fin. expenses: US$ 55 mi</td>
<td>Δ fin. expenses: US$ 65 mi</td>
<td>US$ 360 mi spent in 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Up to US$ 1.8 billion Cash Flow by 2023

¹ Considers 2018 metallurgical/coal mix/prices estimates.
Altogether there is an extra US$ 7.9 billion EBITDA opportunity by 2023.

Source: Bloomberg as of November 27th, 2018.
Investments required are moderate

Investment, in US$ billion

<table>
<thead>
<tr>
<th>Year</th>
<th>Sustaining (includes replacement)</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018E</td>
<td>3.7</td>
<td>2.8</td>
</tr>
<tr>
<td>2019E</td>
<td>4.4</td>
<td>3.7</td>
</tr>
<tr>
<td>Next years¹</td>
<td>4.5</td>
<td>3.7</td>
</tr>
</tbody>
</table>

¹ Average 2020-2023.
Robust Cash Flow can be generated in any scenario

Free Cash Flow\(^1\) accumulated 2019-21, in US$ bi

<table>
<thead>
<tr>
<th>Iron ore price (US$/t)</th>
<th>Nickel price (US$/t)</th>
<th>Free Cash Flow(^1)</th>
<th>Nickel price (US$/t)</th>
<th>Nickel price (US$/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12,000</td>
<td>~23</td>
<td>12,000</td>
<td>~23</td>
</tr>
<tr>
<td></td>
<td>16,000</td>
<td>~25</td>
<td>16,000</td>
<td>~25</td>
</tr>
<tr>
<td></td>
<td>20,000</td>
<td>~27</td>
<td>20,000</td>
<td>~27</td>
</tr>
<tr>
<td>60</td>
<td>~23</td>
<td>~25</td>
<td>~27</td>
<td>~25</td>
</tr>
<tr>
<td>65</td>
<td>~28</td>
<td>~30</td>
<td>~32</td>
<td>~30</td>
</tr>
<tr>
<td>70</td>
<td>~33</td>
<td>~35</td>
<td>~37</td>
<td>~35</td>
</tr>
</tbody>
</table>

\(^1\) Does not consider dividends, buybacks and bolt-on acquisitions. Considers US$ 1.3 bi of cash surplus in 2018 to be allocated in the following years to keep net debt level at US$ 10 bi target.
Vale will allocate capital in a disciplined way.

Annual average available cash, 2019-21

US$ 8–12 bi

~US$ 4 bi minimum remuneration

Excess cash will be allocated among extraordinary dividends, buybacks, bolt-on acquisitions and financial flexibility.

To be determined in February and July.
Top 3 priorities for value creation

Maximize flight to quality rewards in Iron Ore

Transform Base Metals into a significant cash generator

Capital discipline