



Integrated  
Report  
**2022**

# Summary

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**Credits**

**Cooperation** means to listen.  
Cooperation means **creating a collective capacity to think, engage, dream and implement possible futures for all, together.**

# Letter from the Chairman of the Board

GRI 2-22

The world is on the threshold of a powerful energy transition. At the same time, companies and governments are faced with the task of overcoming the challenges posed by an increasingly complex world including geopolitical concerns, energy crises in Europe and in global supply chains, high levels of global inflation, and the slow recovery from the pandemic in some regions of the planet, to name a few.

Vale, as a global company, is entrenched in this scenario and has been implementing its strategy not only to ensure effective operational performance, but also to create value for society, investors, employees, suppliers, communities, among other stakeholders.

Our business needs to respond both globally and within the mining industry. Climate change mitigation directs the world towards a necessary energy transition, but the pace of action may be affected in the long term by dependence on gas and other fossil fuels. Within our sector, the safety of people and our operations is an immediate imperative for risk management strategies.

Vale's Board of Directors has the role of overseeing and supporting our journey towards a more sustainable and safer mining model, allowing for the development of low-carbon solutions, combined with the creation of value for society and a focus on business discipline. To exercise its role more efficiently and assertively, the Board underwent a reformulation process including the adoption of market best practices and electing independent officers, including the Chairman of the Board.

Vale's by-laws, regulations and corporate governance today follow international standards, similar to those of our European peers. We consider ourselves a true corporation. However, Board composition can still be improved. We need to increase the diversity of Board members in terms of gender and race, in addition to having international participation.

Another noteworthy advance has been in executive, variable compensation, which includes environmental, social and governance (ESG) metrics. In the short term, 30% to 40% of collective targets are linked to non-financial indicators and ESG, while 35% are linked to

financial targets. In the long term, the contribution of ESG metrics rose from 20% in 2020 to 25% in 2022. This demonstrates the company's commitment to the future impact of our decisions today.

With regard to the governance of our dams and tailing facilities, the lesson learned from the Brumadinho tailings dam failure resulted in a complete transformation of our risk management processes, and the safety of Vale's assets. Today, in order to ensure greater effectiveness and reliability of the overall risk-management process and company decision-making, the company operates according to a management model based on several layers of defense, that is subject to ongoing self-assessments and reviews carried out by third parties.

Reports providing updates on the integrity of our geotechnical structures undertaken by independent experts are periodically reviewed by the Board of Directors and disclosed publicly. We have sought to implement the Global Industry Standard for Tailings Management (GISTM), as well as the leading tailings management

standards and legislative amendments that have been introduced in Brazil and are in place in Canada.

Our tailings dam management system is in line with the GISTM. Our goal is to reach 100% conformance of critical structures<sup>1</sup> by August 2023 and, by August 2025, we expect to bring the standard to all geotechnical structures we operate.

Vale is committed to improving our performance and contributing to enhancing the lives of people in the areas where we operate. The company has invested in technological solutions to reduce its carbon emissions by carrying out tests with locomotives, trucks, and electrical equipment in Brazil, as well as in its underground mine operations in Canada. Through the Vale Fund, it has sponsored forest recovery and protection, in addition to investing in research on biodiversity through the Vale Institute of Technology (ITV).

In the social field, in 2021 our Executive Committee announced the bold target to support the upliftment of half a million people out of extreme poverty by 2030. In



photo: Jose Palma

Vale's Board of Directors has the role of **overseeing and supporting** our journey towards a **more sustainable and safer mining model**.

2022, we developed a roadmap with targeted actions. A comprehensive international study was carried out, experts were consulted, and they corroborated our understanding that extreme poverty is multidimensional, and influenced by several factors, beyond those purely financial.

In order to reach this target, we will need to work with great managerial and mobilization capacity, aiming to build partnerships with the public and private sectors, in addition to working with competent organizations already working within this field, but that may lack the resources to scale actions to greater social transformation.

We want to contribute to the empowerment of local communities that may not have access to fundamental rights, enabling them to become resilient and leaders of their own future. This will also help in Vale's own cultural transformation.

We thank all our stakeholders and invite you to join us in our path towards sustainable mining aligning our progress to society's needs and their expectations of our business.

**José Luciano Penido**  
Chairman of the Board  
of Directors at Vale

<sup>1</sup> Critical structures are those categorized in 'extreme' or 'high' potential consequences according to the GISTM methodology.

# Letter from the CEO

GRI 2-22

Since the failure of the Mina do Córrego do Feijão dam, in Brumadinho, our primary commitment has been on compensation and reparation, always undertaken through dialogue and with respect. We have made significant progress, but we know that there is still much to be done, especially in continuing the search for the three people who have not yet been located. We will never forget Brumadinho and the lessons learned from the tragedy will stay with us forever.

In these last four years, we have publicly stated before a wide variety of stakeholders our commitment to act strategically to eliminate any risks associated with our operation, to remodel our business and, as a consequence of the lessons learned and of our operational discipline, to reposition the company before the market and other audiences.

In 2022, we made important progress with respect to the decharacterization<sup>1</sup> of our tailings dams. To date, we have decharacterized 40% of our upstream structures and the B3/B4 dam in Nova Lima, Minas Gerais, has been downgraded from the highest risk level<sup>2</sup>. This was made possible through the advancement of the decharacterization process, with the

removal of more than 50% of the tailings originally held within that facility. We have spared no effort in this challenge, and we expect to have no dams at critical level by 2025.

Our main value is life first, and safety has become an obsession in our company. Part of this commitment is to the health and well-being not only of those who make up our company, but also to the communities with whom we interact. We achieved major advances last year and we are relentlessly pursuing progressively better results. The foundations of our management system, the Vale Production System (VPS), are already in place, but we need to ensure its adoption by all direct employees and contractors.

Vale remains truly committed to promoting inclusion and valuing diversity, and we have achieved positive results. We ended 2022 with 22.1% women in our workforce and 22.6% in top leadership positions. Our goal is to double the representation of women in the company, from 13% to 26%, by 2025. Today, we have about five thousand more women than in 2019, when the target was announced. Vale has also set the goal that 40% of leadership positions (coordinators and above) in Brazil be occupied by black

employees by 2026. We ended 2022 with 32.1% of these positions occupied by self-declared black people.

2022 was special for the company: we celebrated our 80th anniversary and are now looking ahead to the next 20 years. What type of company do we want Vale to be on its 100th anniversary? We are well positioned as a major player in the ongoing energy revolution. We have the capacity to meet the demand for metals essential for the electric vehicle industry, such as nickel, copper and cobalt.

Our core business, iron ore, is also transforming and offers solutions for the decarbonization of the steel industry. We have signed agreements with customers in the Middle East to create mega hubs, focused on low-carbon products such as green briquettes. Developed by Vale, this innovative product can reduce emissions in steel production by up to 10%. We are building a briquette plant in Vitória, Espírito Santo, to meet market demand. We have entered into decarbonization partnerships with more than 30 customers, representing about 50% of our Scope 3 emissions. In the pelletizing area of our business, we are testing biocarbon to replace anthracite coal.

The re-use of tailings generated in the iron ore production process as an alternative to riverbed or coastal sand mining is another line of action in the circular economy. The product has several commercial applications, such as concrete, mortar, artifacts, cement, and road pavement. Each ton of sand produced represents one less ton of tailings being disposed of in piles or tailings dams.

There has been a lot of talk about nature-based solutions, and we at Vale understand this concept of being a “nature-based business” because we see it as an opportunity. We have a range of initiatives, from science and research, through the Vale Institute of Technology, to actions that encourage the bioeconomy and forestry agenda, under the responsibility of the Vale Fund. During the UN Climate Change Conference (COP-27), we launched important initiatives to support this, such as “*Biomass*” (meaning Biomes), a joint venture with other companies that will contribute to the recovery and protection of forests in Brazil.

In 2022, we also celebrated 40 years of relations with the Xikrin do Cateté Indigenous People. We concluded an agreement, and to



In these last four years, we have publicly stated before a wide variety of stakeholders our commitment to **act strategically to eliminate any risks associated with our operation.**

celebrate, I had the opportunity to visit the mother village of the Xikrin. A new chapter of this relationship is being built, based on trust and dialogue. This action is part of the goal of contributing to the indigenous communities neighboring our business in the pursuit of their rights, and is linked to our Social Ambition, launched at the end of 2021 and formalized in 2022.

This Social Ambition includes the goal of contributing to lifting 500,000 people out of extreme poverty by 2030. We understand that the fight against social inequality is crucial and must be tackled with the engagement of all sectors of society: public authorities, companies, and third-party entities.

The milestones presented here – some of which have already produced concrete results – help build the future of the Vale we want: a company focused on promoting sustainable mining and developing low-carbon solutions, without losing sight of discipline in capital allocation.

In conclusion, I thank everyone who has dedicated their efforts and resources in helping us to honor our commitments. I invite you, the reader, to consider this report from the perspective that we are on a journey, guided by a single purpose: to improve life and transform the future together.

**Eduardo Bartolomeo**  
CEO of Vale

<sup>1</sup> Decharacterization is the process of reshaping the terrain of our upstream tailings dams and partially or totally removing tailings from the reservoir and reintegrating the structure into the environment, so that the structure no longer serves its primary purpose of tailings disposal.

<sup>2</sup> Risk level (or emergency level as defined on Brazilian regulation ANM 95/2022) classifies potential risks that could compromise dam safety.

# Highlights of the year 2022

## 22.1%

women in our workforce.

## 22.6%

women in top leadership positions.

## 32.1%

Self-declared black people in leadership positions.



## 139

businesses supported by the Vale Fund, benefiting approximately

## 9 thousand families.

## USD 2.4 billion

in social, environmental and institutional expenditures, **83% more** than in 2021.



### Innovation

We were ranked **first and second**, respectively, in the rankings of **most innovative companies** by the Dom Cabral Foundation and Valor Econômico newspaper. **We also received the award for company of the year in innovation and technology from Brasil Mineral magazine.**

## 100%

of Vale's active operations in Brazil with **human rights due diligence conducted.**



## -44%

in the total accident rate compared to 2021.



### Organizational culture favorability index **75%**

five points more than in 2021.

### Indigenous peoples

Engagement with the **Kayapó People** to prepare the **Indigenous Land Consultation Protocol**, which will help them exercise their **right to Free, Prior, and Informed Consent (FPIC).**

### Self-generated electricity

Our portfolio is **98.6%** renewable.

### Environmental recovery

**11 km<sup>2</sup>** of areas restored.



### Over **USD 42 billion**

of economic value shared with stakeholders.



# Approach to reporting

This is Vale's Integrated Report for the period from January 1 to December 31, 2022<sup>1</sup>. The report includes information related to the companies over which Vale has operational control and their activities identified in Form 20-F, with the exception of operational units which have been sold<sup>2</sup>. [GRI 2-2 | 2-3](#)

In this report, we share lessons we have learned, challenges we have faced, and advances we have made. This content has been shaped by our own reflection and by active listening with our stakeholders. The material issues we have identified ([see more in Materiality](#)) guide the indicators we report on, our management approach, and our accountability on environmental, social, and governance (ESG) matters.

The Brumadinho Reparation has been a driving force for change. Our commitment



For questions, feedback and comments about this publication, please reach out through the [Contact Us](#) channel. [GRI 2-3](#)

to ensuring that an event of this nature will never be repeated means we remain steadfast in our ambition to be a safer and more reliable company. The common thread throughout this year's report is our purpose: "We exist to improve life and transform the future. Together." It reinforces our transformation journey through dialogue, transparency and rapprochement between Vale and its stakeholders.

Vale has reported in compliance with the GRI Standards for the period from December 1 to December 31, 2022. In addition, the document is aligned with the guidelines of the International Integrated Reporting Framework, now consolidated under the International Sustainability Standards Board (ISSB). The Integrated Report is presented following the integrated reporting framework and addresses material matters to offer a balanced view of strategy and how it relates to the company's ability to create and preserve value in the short, medium, and long term.

We also report on our adoption of the Mining Principles of the International Council on

Mining and Metals (ICMM) including meeting the ICMM Performance Expectations, as an active and committed ICMM member. This report and the ESG Databook (a separate downloadable Excel document) also include indicators from the Sustainability Accounting Standards Board (SASB), now part of the International Financial Reporting Standards Foundation, the Task Force on Climate-related Financial Disclosures (TCFD), the World Economic Forum (WEF) key metrics, and the United Nations (UN) Sustainable Development Goals (SDGs). [GRI 2-14](#)

In addition to the limited assurance performed by PwC, detailed in the [Assurance Report](#), our Integrated Report was also considered and reviewed by our Executive Committee, with oversight by the Sustainability Committee. The Board of Directors recognizes its responsibility to ensure the integrity of the annual report and acted in the definition of guidelines for the preparation and presentation of the report. The content was also subjected to independent reader review (see more in [Peer Reviewers](#)). [GRI 2-5 | 2-12 | 2-14](#)

## More information about our results is available at:

- [20-F, Management Report, Fiscal Transparency, Reference Form and Financial Statements](#)<sup>3</sup>
- [Governance Report](#)
- [ESG Portal](#)
- [Reparation Balance](#)
- [Other editions of Vale's sustainability reports](#)

As a member of the ICMM, Vale is expected to implement the ICMM's Mining Principles and Performance Expectations as a condition of membership. We support and endorse these, and the ICMM's efforts at the international level to enhance the transparency of mineral revenues, including through the Extractive Industries Transparency Initiative (EITI), and engaging constructively in appropriate forums to improve the transparency of mineral revenues. We support and are committed to the implementation of the GISTM, an effort to improve safety in all phases of the tailings storage facilities' lifecycle. For more information, please [access our ESG Portal](#).

The dollar amounts published in this report have been converted from Brazilian reais to US dollars based on the average annual currency rate of BRL 5.16 to USD 1.00, except for financial disclosure amounts, and socioenvironmental expenditures which were used the monthly exchange rates.

**Vale Executive Committee** (left to right): Rafael Bittar, Marcelo Spinelli, Carlos Medeiros, Maria Luiza Paiva, Alexandre Pereira, Eduardo Bartolomeo Bartolomeo, Deshnee Naidoo, Gustavo Pimenta, Marina Quental, Alexandre D'Ambrosio.

## ESG Databook

Refer to the ESG Databook, attached to this report, which includes content from GRI; the SASB Mining & Metals standard; TCFD; WEF Key Metrics and the SDGs, as well as adherence to the Mining Principles of ICMM. The basis for preparation cited in the PwC Assurance Report is in the Databook.

<sup>1</sup> Exceptions in the reporting limits are presented in the RI Basis of Preparation in the ESG Databook.

<sup>2</sup> Estrela Ferroligas de Manganês (Barbacena Ferroalloy Plant and Ouro Preto Ferroalloy Plant), Mineração Corumbense Reunida, Transbarga Navegacion, Vale Nickel (Dalian) Co. and Vale Moçambique.

<sup>3</sup> The Company renamed its main operating segments starting from these financial statements. The operating segment previously named "Ferrous Minerals" is now disclosed as "Iron Solutions" while the "Base Metals" operating segment is now disclosed as "Energy Transition Materials".

**Note 1:** This document may include statements that reflect Vale's current expectations regarding future events or results. All forward-looking statements involve various risks and uncertainties. Vale cannot guarantee that such statements will prove to be accurate. These risks and uncertainties include, among others, factors related to: (a) countries where Vale operates, especially Brazil and Canada; (b) the global economy; (c) capital markets; (d) mining and metals prices and their dependence on global industrial production, which is cyclical in nature; (e) the high degree of global competition in the markets where Vale operates; (f) mining and tailings storage operations; and (g) the estimation of mineral resources and reserves, their exploration and the development of mining facilities, our ability to obtain or renew new licenses, and the depletion and exhaustion of mines and mineral reserves and resources. For additional information on factors that may give rise to results different from those estimated by Vale, please consult the reports filed by Vale with the U.S. Securities and Exchange Commission (SEC), the Brazilian Securities and Exchange Commission (CVM) and, in particular, the factors discussed in the sections "Forward-looking Statements" and "Risk Factors" in Vale's Annual Report Form 20-F.

**Note 2:** In March 28th, 2023, Vale entered into an agreement with the US Securities and Exchange Commission (SEC) that will terminate a lawsuit filed by the SEC in April 2022. Under the agreement, without admitting or denying the settled claims, Vale will make payments totaling USD 55.9 million to the SEC. In addition, the SEC will not oppose Vale's motion to dismiss all claims that the company acted with fraudulent or reckless intent regarding its disclosures. The settlement was approved by the Court in April 2023.

# Materiality

GRI 2-12 | 2-25 | 3-1 | 3-3

In 2022, we reviewed our materiality matrix. This annual cycle included alignment with the approach to materiality embedded in the GRI Universal Standards 2021, and an initial evaluation of the concept of double materiality.

We evaluated diverse impacts, risks and opportunities through two complementary perspectives:

**Impact**  
The relevance of our impacts on the economy, on the environment and on people, including human rights; and

**Financial**  
The potential impacts on the company's financial performance and ability to create value.

Throughout the year, we systematically promoted listening and dialogue through existing engagement channels; feedback about the Integrated Report encouraged continuous improvement; our vision of the future and perspectives on the material topics were strengthened; and evaluation of the alignment of the company's actions with our purpose was undertaken.

The materiality process was conducted between September and November 2022 and divided into **five phases:**

<b>Phase 1</b>	Evaluation of frameworks and external global trend reports related to the material topics. During this stage, we confirmed that the 10 material topics should be maintained and that they consider, in their scope, the relevant impacts, risks, and opportunities on the corporate and mining sector agenda.
<b>Phase 2</b>	Incorporation of inputs from continuous stakeholder engagement and listening channels, and consultation of Vale's publically available information.
<b>Phase 3</b>	A pilot process to understand the financial materiality of the topics addressed by assessing public disclosures and the corporate risk management process, in particular assessing the severity of the financial impact of business risks, including those related to the material topics.
<b>Phase 4</b>	A round of 26 individual interviews, with 15 of Vale's top executives and the Sustainability Committee and 11 external specialists, on issues related to the material topics in order to calibrate the results.
<b>Phase 5</b>	Final consolidation of results and validation.

The result was the maintenance of the current material topics, without significant changes in their scope. Our ESG Databook contains fact sheets with a detailed overview of each topic and how we engage with our stakeholders. Vale's 10 material issues consolidate the most relevant impacts, risks and opportunities for sustainable value generation.

Cutting across all of them is innovation, which is the value creation lever that drives our ability to maximize positive impacts, capture opportunities, avoid risks and mitigate negative impacts.

You will find more details on the materiality process on the [ESG portal](#).

## Material Issues GRI 3-2



See on next pages the relationship between the material topics, standards, frameworks, pillars, values, ambitions, risks, opportunities, advances and challenges.

\* Crosscutting to all the material themes



## Dams<sup>1</sup>

### GRI content and SASB indicators

GRI 3-3, MM3

SASB Tailings storage facility management (EM-MM-540a.1, EM-MM-540a.2 e EM-MM-540a.3, 540a.3, EM-MM-150a.5, EM-MM-150a.6, EM-MM-150a.9 and EM-MM-150a.10)

### Capitals of Integrated Reporting

Natural, Social & Relationship

### SDGs 3, 6, 9 e 12



### Strategic pillars / Connection with our purpose

Sustainable mining

Value:

- Life matters most;
- Value the people who build our company;
- Make it happen.

Ambition:

- A benchmark in safety;
- Talent-driven organization;
- Leader in sustainable mining.

### Risks

- Dam failure.
- Social and environmental impacts.
- Evacuation of areas.

### Opportunities

- Technologies for reducing dependence on dams.
- Tailings byproducts.

<sup>1</sup> Dam also covers EARs (tailings storage structures), considering sediment, water and tailings dams, drained piles and saddle and internal dikes (tailings dams can also be grouped into dam systems).

## Biodiversity

### GRI content and SASB indicators

GRI 3-3, 203-1, 304, MM1, MM2

SASB Impacts on biodiversity (EM-MM-160a.1, EM-MM-160a.2 and EM-MM-160a.3)

### Capitals of Integrated Reporting

Natural, Social & Relationship

### SDGs 6, 12, 14 e 15



### Strategic pillars / Connection with our purpose

Sustainable mining

Value: Respect our planet and communities.

Ambition:

- Leader in sustainable mining;
- Benchmark in creating and sharing value

### Risks

- Impacts on areas of high biodiversity value.

### Opportunities

- Intensify our contribution to the Amazon biome.
- Investment in biodiversity research and conservation.
- Development of impact businesses for biome restoration.
- Development of new technologies that support prevention of fires and other risks.

## Local communities

### GRI content and SASB indicators

GRI 3-3, 203, 411, 413, MM5, MM6, MM7, MM9

SASB Community Relations (EM-MM 210a.1, EM-MM-210a.2, EM-MM-210b.1, EM-MM-210b.2)

### Capitals of Integrated Reporting

Social & Relationship

### SDGs 1, 2, 3, 5, 7, 8, 9, 10, 11 e 17



### Strategic pillars / Connection with our purpose

Sustainable mining

Value: Respect our planet and communities.

Ambition:

- Leader in sustainable mining;
- Benchmark in creating and sharing value.

### Risks

- Social and environmental impacts arising from the operation.
- Health and safety in the communities where we operate.
- Risk of involuntary resettlement and land use conflicts.
- Risk of conflicts with indigenous peoples and traditional communities.

### Opportunities

- Maximizing value generation for communities.

## Human rights

### GRI content and SASB indicators

GRI 3-3, 406, 408-1, 409-1, 410-1

SASB Safety, Human Rights and Rights of Indigenous Peoples (EM-MM 210a.3)

### Capitals of Integrated Reporting

Social & Relationship

### SDGs 3, 8 e 16



### Strategic pillars / Connection with our purpose

Sustainable mining

Value: Respect our planet and communities.

Ambition:

- Leader in sustainable mining;
- Benchmark in creating and sharing value.

### Risks

- Risks of human rights violations at our operations, and along the value chain.

### Opportunities

- Advance the inclusion of human rights in all company processes and decision making.
- Contribute to promoting the human rights agenda in companies in the mining sector and in other sectors, in Joint Ventures and with customers.

## Mine closure and future use

### GRI content and SASB indicators

GRI 3-3, MM10

### Capitals of Integrated Reporting

Social & Relationship; Natural

### SDGs 1, 2, 6, 8 e 11



### Strategic pillars / Connection with our purpose

Sustainable mining

Value: Respect our planet and communities.

Ambition:

- Leader in sustainable mining;
- Reference in creating and sharing value.

### Risks

- Failure to achieve regulatory and legislative compliance.
- Non-recovery of biodiversity.
- Invasion and misuse of land.
- Limited economic diversification, maintaining local dependence on mining activities.

### Oportunidades

- Minimize risks in areas where we operate and generate skills for future uses.
- Generation of value for the areas where we operate, economic diversification and deployment of new business.

## Governance and Compliance

### GRI content and SASB indicators

GRI 2-9 a 2-21 (General Disclosures – Governance), 2-27, 3-3, 201, 205 and 206

SASB Business Ethics & Transparency (EM-MM-510<sup>a</sup>.1, EM-MM-510a.2), Workforce Health & Safety (EM-MM-320a.1)

### Capitals of Integrated Reporting

Social & Relationship; Financial; Manufactured

### SDGs 16



### Strategic pillars / Connection with our purpose

Sustainable mining

Value: Act with integrity.

Ambition:

- Best-in-class reliable operator;
  - Benchmark in creating and sharing value.
- Behavior:** Sense of ownership.

### Risks

- Market risks.
- Operational risks.
- Legal and tax risks.
- Mergers, acquisitions and divestments.
- Abusive and discriminatory practices.
- Strategic, financial and cyber risks.
- Changing laws and regulations.

### Opportunities

- Cultural Transformation.
- Innovation and new technologies.

## Eco-efficiency

### GRI content and SASB indicators

GRI 3-3, 303, 305

SASB Quality of Air (EM-MM-120a.1), Water Management SASB EM-MM-140a.1 and SASB EM-MM-140a.2

### Capitals of Integrated Reporting

Natural, Social & Relationship

### SDGs 3, 6, 12, 14 e 15



### Strategic pillars / Connection with our purpose

#### Sustainable mining

**Value:** Respect our planet and communities.

#### Ambition:

- Leader in sustainable mining;
- Benchmark in creating and sharing value.

### Risks

- Water crisis and unavailability of water.
- Compliance with ICMM quality standards for effluent discharge.
- Atmospheric emissions from operations.

### Opportunities

- Expansion of the water monitoring network and identifying new technologies.
- Efficient use of water resources through dry processing.
- Global strategy for reducing atmospheric emissions.

## Climate change

### GRI content and SASB indicators

GRI 3-3, 201, 302, 305

SASB Greenhouse Gas Emissions (EM-MM-110a.1, EM-MM-110a.2), Energy Management (EM-MM-130.a.1)

### Capitals of Integrated Reporting

Natural, Social & Relationship

### SDGs 7 e 13



### Strategic pillars / Connection with our purpose

#### Sustainable mining: Low-carbon solutions

**Value:** Respect our planet and communities.

#### Ambition:

- Leader in sustainable mining;
- Benchmark in creating and sharing value.

### Risks

- **Transition risks:** changes in demand pattern, changes in public policies to restrict emissions, (including carbon taxation) and reputational risk, among others.
- **Physical risks:** increase in average temperature, extreme weather and sea conditions.

### Opportunities

- Development of decarbonization solutions.
- Use of proprietary technology to offer more premium products.
- Increasing renewable energy representation in our energy matrix.
- Indicators and requirements for engaging with customers and suppliers.

## People

### GRI content and SASB indicators

GRI 2-7, 2-8, 3-3, 201, 401, 404, 405, 406, 407

SASB Labor Relations (EM-MM-310a.1, EM-MM-310a.2)

### Capitals of Integrated Reporting

Human, Intellectual, Social & Relationship

### SDGs 4, 5 e 8



### Strategic pillars / Connection with our purpose

#### Sustainable mining

#### Value:

- Life matters most;
- Value the people who build our company;
- Make it happen.

#### Ambition:

- A benchmark in safety;
- Talent-driven organization;
- Leader in sustainable mining.

### Risks

- Local labor laws.
- Hiring of outsourced labor.
- Leadership Succession Plan.

### Opportunities

- Implement and accelerate a Technical Training Program for our employees.
- Training and engagement of operational leaders in Cultural transformation.

## Health and safety

### GRI content and SASB indicators

GRI 403

SASB Workforce health & safety (EM-MM-320a.1)

### Capitals of Integrated Reporting

Human; Social & Relationship

### SDGs 3



### Strategic pillars / Connection with our purpose

#### Sustainable mining

#### Value:

- Life matters most;
- Value the people who build our company;
- Make it happen.

#### Ambition:

- A benchmark in safety;
- Talent-driven organization;
- Leader in sustainable mining.

### Risks

- Risks related to workplace accidents and fatalities.
- Risks related to employee health.
- Risk of process accidents or catastrophic events (Process Safety and Operational Risk management) in activities including open pit mining, underground mining, and metal refining and processing.

### Opportunities

- Structuring critical control checks.
- Accelerate the use of technology to remove people from risk.

photo: Leo Lopes



**In this chapter:**

Purpose and Values

Vale Worldwide

Business model

Innovation oriented

Strategic pillars

Advances in our long-term commitments

# About Vale

GRI 2-1 | 2-6

Founded on June 1, 1942, Vale S.A. is one of the world's leading producers of iron ore and nickel. We produce and sell iron ore, iron ore pellets, nickel, copper, platinum group metals (PGMs), gold, silver, and cobalt as byproducts of nickel and copper.

In addition to mining, we operate logistics systems, including railroads, marine terminals, and ports that are integrated with our mines. We run distribution centers to support iron ore delivery throughout the world. We also have investments in electric energy and steel businesses through affiliates and joint ventures.

Vale's headquarters are in Rio de Janeiro, Brazil – but the company is present in many parts of the world. A publicly held company since 1970, Vale's shares are traded on the Novo Mercado of the São Paulo Stock Exchange (B3) and on the New York (NYSE) and Madrid (Latibex) stock exchanges.

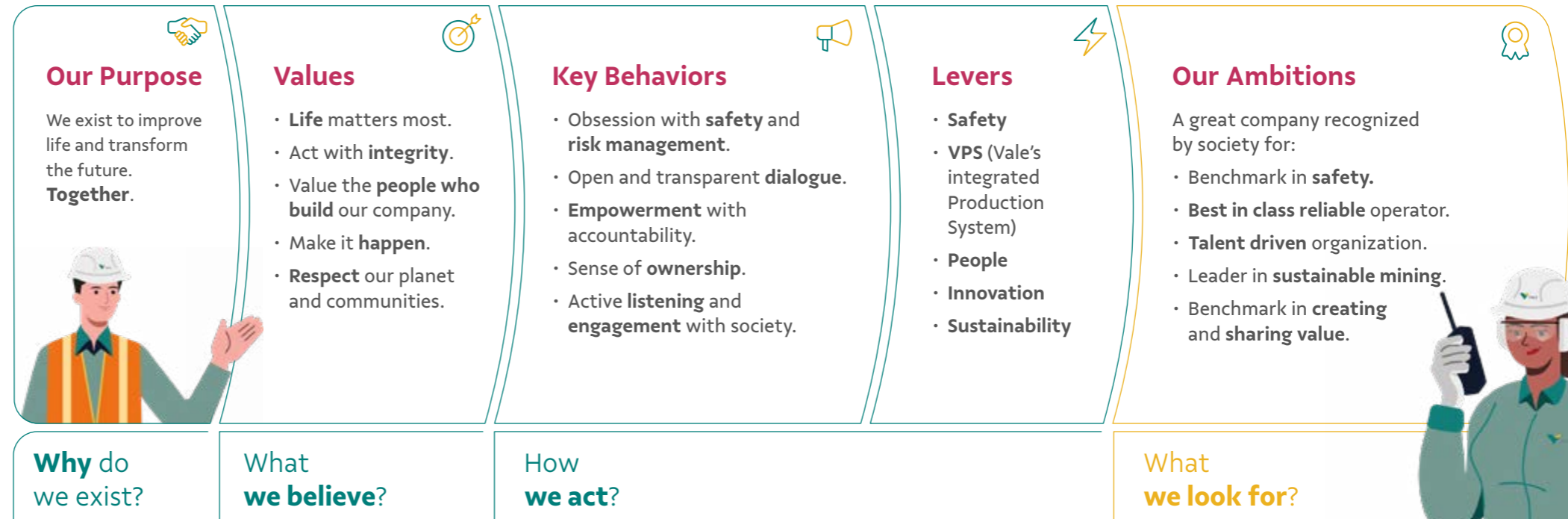
# Purpose and Values

Ours is a story of transformation: of the ore, of the country, of the people and of the company, which currently present in 18 countries. We aim to transform our mistakes into lessons learned and believe that the only way to serve a constantly changing society is through continuous transformation, on a

journey in which we walk hand-in-hand with our stakeholders, with responsibility, transparency, and consistency.

We believe that doing it together means actively listening, but this will only be valuable if it is comprehensive: society,

partners, customers, and the people who make Vale what it is, everywhere it operates. We believe that doing it together means creating a collective capacity to think, engage, design, and accomplish possible futures for all.



# Vale Worldwide

- Exploration
- Joint Venture
- Offices
- Headquarter
- Operation
- Port
- Railroad
- Underground Mine

Activities map GRI 2-1



## Vale serves industries, such as steel industry, on all continents

GRI 2-6

**Americas** South, Central and North America

**Europe** including Türkiye

**Asia and Africa**, considering:

**Middle East North Africa and India (Menai)** – Middle East, North Africa and India

**The Chinese Mainland and Taiwan, Japan, Korea, Southeast Asia** – Vietnam, Indonesia, Malaysia and Philippines

**Oceania** Australia

### Brazil



Energy Consumption Matrix By Source: GRI 302-1

Electricity	Diesel oil	Coal and coke	Natural gas	Other oils	Renewable fuels
30.2%	28.2%	14.1%	16.0%	8.2%	3.0%

Other fuels:  
 •Other gases: 0,1%  
 •Navigation oils: 0,1%  
 •Other liquid fuels: 0,1%

Vale completed the year with around

# 308 Mtpa

of iron ore production capacity and expects to reach up to 320 Mt by the end of 2023

**140** Total dams<sup>1</sup> and Tailings Storage Facilities

**39** TSFs  
 37 in the Ferrous and 2 in South Atlantic Base Metals Operations

**101** tailing dams  
 82 at Ferrous and 19 at South Atlantic Base Metals Operations

30 upstream geotechnical structures will be decharacterized in Minas Gerais and Pará by 2035, of which 12 have already been concluded since 2019.

<sup>1</sup> Dam also covers EARs (tailings storage structures), considering sediment, water and tailings dams, drained piles and saddle and internal dikes (tailings dams can also be grouped into dam systems).

# Business model

**Financial Capital**

- USD 86.9 MM in total assets
- Divestment of 9 non-core assets since 2019, eliminating expenditures of up to USD 2 Bn per year

**Human Capital**

- +215 thousand employees (own and outsourced)
- 22.1% women in the workforce
- 32.1% black people in leadership positions

**Intellectual Capital**

- USD 149.3 MM invested in ITV-DS and ITV Mining since 2011
- USD 12.3 MM invested in R&D by ITVs in 2022 alone
- 8 internal innovation hubs and participation in the Mining Hub
- 48 patents granted to Vale since 2011, 10 in 2022

**Manufactured Capital**

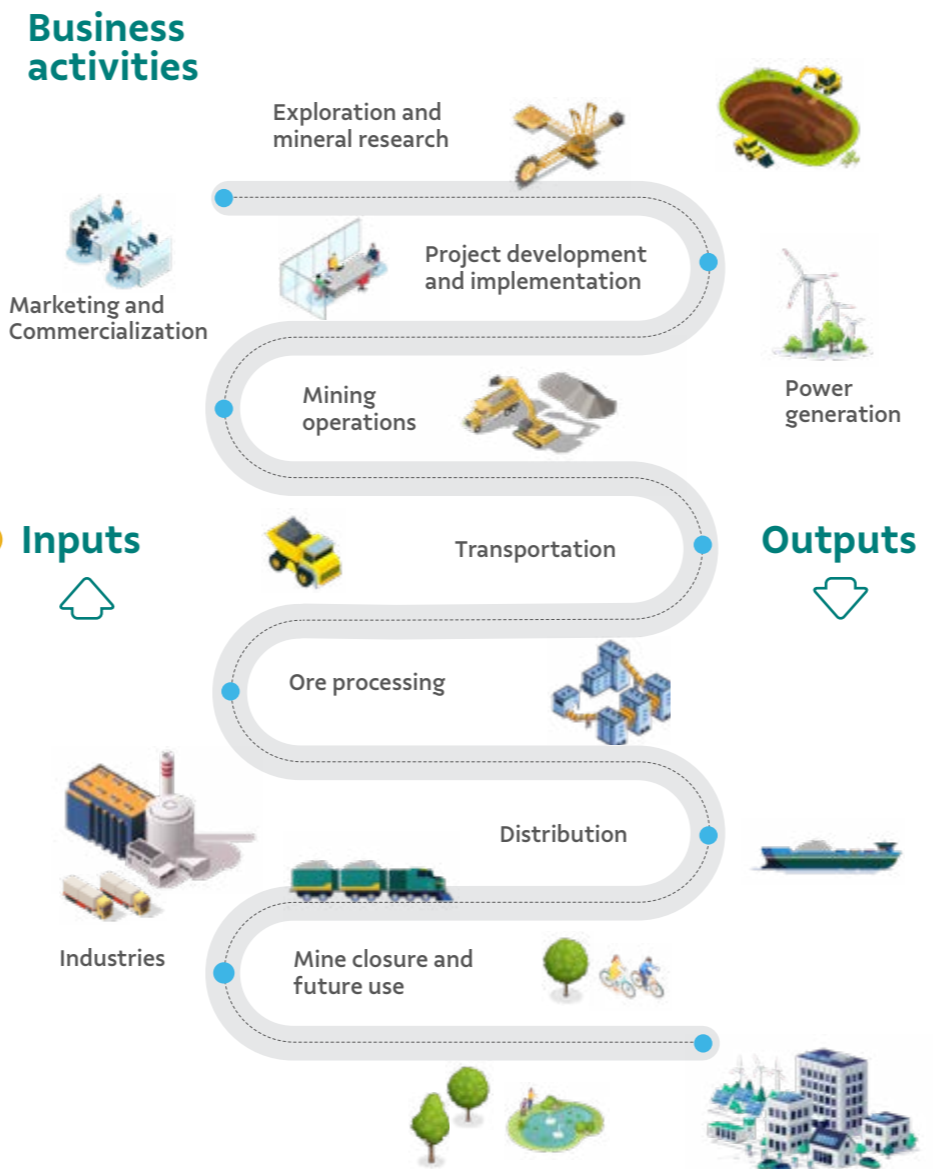
- Operating units\* in 18 countries
- ~2,000 km of own railroads

**Natural Capital**

- 397 M of m<sup>3</sup> of water withdrawal
- 137 thousand TJ of energy consumed (29% renewable)
- 88 thousand ha occupied by our operations
- 965 thousand ha of protected areas

**Social and Relationship Capital**

- +18,000 suppliers
- USD 11.1 Bn in local procurement (56% of total)
- 1,532 local communities, 26 indigenous peoples and 47 traditional communities mapped



**Financial Capital**

- 19.8 Bn of adjusted EBITDA from continuing operations
- USD 16.8 Bn net income from continued operations
- USD 7.9 Bn of taxes paid to governments
- USD 2.4 Bn in social and environmental expenditures, USD 140.5 M in voluntary investments

**Human Capital**

- 44% reduction in total accident rate since 2021
- 95 events with injuries to community members
- 76h of training on average for employees

**Intellectual Capital**

- 1st most innovative company in Brazil (FDC) and 2nd place (Valor)
- 77 scientific publications and R&D projects supported by ITV

**Manufactured Capital**

- 308 Mt of iron ore; 32 Mt of pellets; 253 kt of copper; 179 Kt of nickel; 530 kt of sand (reuse of tailings) produced
- 860 thousand passengers transported by passenger trains
- 12 decharacterized upstream dams in Brazil

**Natural Capital**

- 8.9 million tCO<sub>2</sub>e emissions (Scopes 1 & 2), a 27% reduction compared to 2017
- 8.02 TWh of electricity generation (98.6% of which is renewable)
- 11km<sup>2</sup> of restored areas in 2022
- 600.4 thousand t of non-mineral waste generated
- 373 Mt of mineral waste (waste rock and tailings) generated

**Social and Relationship Capital**

- Vale Foundation: 1.48 million people impacted
- Vale Fund: 139 impact businesses supported (about 9,000 families benefited)
- 30 thousand complaints received from communities\*\*
- 1,465 families involved in involuntary resettlement processes

\*\*Considering Brumadinho's assistance

**Strategic Pillars**

- Promote sustainable mining
- Foster low carbon solutions
- Stay disciplined



# Innovation oriented GRI 3-3

Innovation is a material topic for us, which cuts across and connects with all the others. To reflect this vision, we have reported several innovation initiatives among the chapters.

For 12 years, Vale has sponsored the [Vale Technological Institutes](#), one focused on mining and the other on promoting sustainability. The latter is a pioneering initiative that contributes to the generation of scientific knowledge on the fauna and flora of the Amazon, among other lines of research.

With the goals of making innovation more sustainable and fostering a culture of innovation to leverage cultural transformation, Vale's Innovation Hubs operate as a development and experimentation network to accelerate the adoption of culture and enhance its integration into our operations. We ended 2022

with a total of 8 active internal innovation hubs.

We expanded our connection with external partners, such as Mining Hub, Fiemglab and Findeslab, of which Vale is a sponsor. Twenty-one challenges were prioritized with external partners in 2022, five of which are the internal operation hubs. We undertake partnerships in a co-construction format, such as the Mining Hub, which is an example of collaboration for innovative solutions in the mining industry as a whole. Participants include 24 mining companies, 700 startups and 15 large suppliers, with a reach of 22 countries. Ninety proofs of concept have been produced in recent years, with the signing of 20 contracts between mining companies and startups.

In another partnership, we worked with the Vale Fund and ITV to develop Colab Nature-based Solutions (NBS), a collaborative environment for generating innovative solutions linked to a science-based bioeconomy, with a focus on the Amazon region. Its purpose is to foster emerging opportunities for Vale's future growth. The project seeks to produce a tested model and identify partners acting together, providing a basis for the development of new and future actions. Read more on [Vale Fund](#) and [Vale Institute of Technology](#).

**In 2022, we developed Vale's first corporate innovation strategy, addressing the pillars of growth and transformation.**

Our work in this area resulted in Vale being recognized as the second most innovative company in Brazil in 2022, by the Valor Econômico newspaper – the award covered not only innovation in mining, but also efforts preventing deforestation in the Amazon. We also received the award for Company of the Year 2022 in innovation and technology from Brasil Mineral magazine and was recognized as Fundação Dom Cabral (FDC) **most innovative company** of 2022.

We invest in and value solutions focused on four pillars:

**Connection with the Ecosystem**

**Research & Development**

**Investment**

**Acceleration of Solutions**



photo: José Palma

# Strategic pillars

Vale is a leader in the supply of products that are essential to the development of the world's production chains. With a focus on maximizing the delivery of value to society, we have made real progress over the past four

years in reducing risks and reviewing the company's assets, fulfilling our 2019–2022 strategic plan. With these commitments fulfilled or underway, we reformulated our strategic planning, guided by the understanding

that new ways of doing business will be required to build the Vale of the future: a company that aims to promote more sustainable mining, seeks low-carbon solutions and a focus on discipline in capital allocation.

## Strategy map 2019–2022: value delivery

Commitment	Topic	Progress
De-risking	Brumadinho <sup>1</sup>	<ul style="list-style-type: none"> <li>• Agreement with legal standing</li> <li>• ~58% of Integral reparation performed</li> </ul>
	Mariana	<ul style="list-style-type: none"> <li>• 441 housing solutions delivered by December 2022</li> <li>• BRL 28.9 Bn in reparations initiatives disbursed since 2015</li> </ul>
	Tailings dam safety	<ul style="list-style-type: none"> <li>• 40% of upstream tailings dams<sup>2</sup> in Brazil decharacterized by 2022</li> <li>• Expected no upstream tailing dam at critical level in Brazil (emergency level 3) by 2025</li> </ul>
	Capacity resumption	<ul style="list-style-type: none"> <li>• Delivering new assets (e.g. four filtration plants, Maravilhas III dam)</li> <li>• Creating resilience to improve flexibility</li> </ul>
Reshaping	Portfolio simplification	<ul style="list-style-type: none"> <li>• 9 business sold in 5 different countries since 2019</li> <li>• Up to USD 2 Bn per year of cash drains eliminated</li> </ul>
	Cost efficiency	<ul style="list-style-type: none"> <li>• Flat fixed costs in 2022 and 2023 (vs. 2021)</li> <li>• Gradual C1<sup>3</sup> reduction as volumes increase</li> </ul>
Reassessment	ESG	<ul style="list-style-type: none"> <li>• 2022 ESG rating upgrade (MSCI and Moody's)</li> <li>• Scope 1, 2 and 3 emissions reduction targets defined</li> <li>• Low carbon products (e.g. iron ore briquettes, certified nickel)</li> </ul>
Capital allocation	Return to shareholders	<ul style="list-style-type: none"> <li>• Solid dividend and interest on equity policy (USD6.6 billion paid 2022 YTD)</li> <li>• Bold buyback programs (approximately 20% of total outstanding shares)</li> </ul>

<sup>1</sup> This considers the signing and execution of the global agreement, with the actions being carried out as planned.

<sup>2</sup> An upstream structure is a structure raised using the upstream raising method, in which the body of the structure is built using the thick tailings deposited in the reservoir, by successively layering them up and in the direction opposite to the water flow (upstream). This is the same construction method as the Brumadinho dam.

<sup>3</sup> Unit cash cost.

## Strategic pillars for Vale do Futuro

### Promote sustainable mining

- People-driven
- Reliable operator
- Benchmark in safety and dam management
- Shared value
- Contributing to nature positive

### Foster low-carbon solutions

- Focus on high quality products and resources
- Iron solutions
- Energy transition metals
- Circular mining

### Stay disciplined

- Efficient capital allocation
- Attractive cash return to shareholders
- Strong balance sheet
- Cost and Capex efficiency

## Strategy for the next 20 years

During the process of reformulating our strategy in 2022, we sought to define a plan of action in line with our current businesses. This plan of action will be fundamental for our success over the next two decades – coinciding with Vale's 100-year anniversary which will be celebrated in 2042:

- sustainable solutions for the steel industry;
- energy transition metals;
- development of circular mining;
- nature-based solutions.

To accomplish this strategy, groups of five-year goals were defined, allowing for revision and adjustment over time, according to the context in which we operate and society's demands.



# Advances in our long-term goals

GRI 2-22 | 2-23 | 2-24

We seek to align our long-term goals to the UN's 2030 Agenda for Sustainable Development (SDGs).

Vale Goals	SDGs	Baseline	Target	Status in 2022 (cumulative result)
Climate change		Baseline 2017: 12.2 MtCO <sub>2</sub> e <sup>1</sup>	Reduce Scopes 1 and 2 absolute greenhouse gas (GHG) emissions by 33% by 2030. Achieve net zero Scopes 1 and 2 emissions by 2050.	27% reduction. <sup>3</sup>
		Baseline 2018: 553.1 MtCO <sub>2</sub> e <sup>2</sup>	Reduce Scope 3 net emissions by 15% by 2035.	14% reduction. <sup>4</sup>
Energy		Baseline 2017: <b>Global:</b> 79% renewable energy consumption. <b>Brazil:</b> 83% renewable energy consumption.	<b>Global:</b> 100% renewable electricity consumption by 2030. <b>Brazil:</b> 100% renewable electricity consumption by 2025. <sup>5</sup>	86.67% of consumption. <sup>6</sup> 99.95% of consumption, with 99.80% assured by renewable certification.
		Baseline 2017: <b>Global:</b> The energy efficiency was 0.335GJ/tFeEq <sup>7 and 8</sup>	Improve the global energy efficiency indicator by 5% by 2030.	0.335 GJ/tFeEq. <sup>7 and 8</sup>
Forests		Baseline 2020:	Recover and protect over 500,000 ha of forest areas beyond company fencelines.	172,484 hectares (including 165,092 ha in protection and 7,392 ha in restoration).
Evolution of ESG practices		Baseline 2019:	Eliminate key ESG gaps in relation to best practices – 63 gaps mapped.	Closure of three more gaps, bringing the total to 57 completed.
Social Ambition		Baseline 2021:	Rank in the TOP 3 in the social requirements of the major external indices and ratings.	We have evolved in the ratings of the main external indices and ratings (MSCI, Sustainalytics, and DJSI), <b>see more in <a href="#">Indexes and Ratings</a></b> .
		Baseline 2021:	Support the lifting of 500,000 people out of extreme poverty. <sup>9</sup>	In 2022, we have defined the methodology for action and planning of actions for the coming years. In 2023, we aim start concept tests to benefit 30 thousand people. For more information, <b>access <a href="#">Fighting Poverty</a></b> .
		Baseline 2021:	Support all indigenous communities neighboring Vale's operations in the development and execution of their plans and their pursuit of rights under the United Nations Declaration on the Rights of Indigenous Peoples.	We formalized the commitment with the Kayapó people for the advancement of the Consultation Protocol of the Kayapó Indigenous Lands, which will contribute to their right to Free, Prior and Informed Consultation. The formulation of the protocol began in December 2022.
Atmospheric emissions		Baseline 2018:	Reduce Particulate Matter emissions by 16%.	4.2 kt.
		Particulate Matter: 7.4 kt	Reduce Sulfur Oxide emissions by 16%.	75.7 kt.
		Sulfur Oxides: 147.4 kt	Reduce Nitrogen Oxide emissions by 10%.	44.7 kt.
		Nitrogen Oxides: 74.1 kt		

- 1 Base year 2017 Scopes 1 and 2 emissions reduced from 13.5 million tonnes of CO<sub>2</sub>e to 12.2 million CO<sub>2</sub>e due to divestments in coal and ferroalloys assets, amanganese operations (except Simões Filho plant), in addition to the Centro-Oeste system and Vale Nickel (Dalian) Co., carried out in 2022. GRI 2-4
- 2 Scope 3 emissions for the base year of 2018 reduced from 585 million tons of CO<sub>2</sub>e to 553 million CO<sub>2</sub>e, due to the same divestments described in the previous note. GRI 2-4
- 3 Absolute greenhouse gas (GHG) emissions reductions from scopes 1 and 2 (market based).
- 4 An increase in Vale's Scope 3 emissions is expected from sales volume growth due to the likelihood of increased demand for our products.
- 5 In 2021, the method for monitoring the renewable electricity target in Brazil was changed from % renewable self-production to % renewable consumption.
- 6 The percentage of renewable electricity varies from year to year depending on consumption, the volume of certificates obtained, and the electricity generation matrix of each country in which we operate.
- 7 In this indicator, the production volumes of Vale's main products, such as pellets, coal, nickel and copper, are converted into ton of iron ore equivalent.
- 8 Until 2021, the Energy Intensity indicator considered the main energy sources in Vale's matrix (coal/coke, fuel oil, natural gas and diesel). After 2022, this indicator will consider the sum of all energy consumption within the organization divided by the published production for the year, transformed into MFe-eq. In addition, divestments concluded in 2022 were also reflected in the 2017 target baseline. GRI 2-4
- 9 People living on less than USD 2.15 a day, according to the World Bank.

Vale Goals	ODS	Baseline	Meta	Status em 2022
Diversity, equity and inclusion (DEI)		Baseline 2019: Women in the workforce: 13%	Increase the presence of women in the workforce to 26% by 2025.	22.1% women.
		Baseline 2019: Women in senior leadership: 12%	Increase the presence of women in senior leadership (executive management positions and above) to 26% by 2025.	22.6% women.
		Baseline 2021: Black leadership	Reach 40% of the leadership <sup>1</sup> in Brazil made up of black people by 2026.	32.1% of the leadership <sup>1</sup> in Brazil is made up of self-declared black people.
Health and safety		Baseline 2019: 57 N2 registered	Eliminate recordable high-potential (N2) injuries by 2025.	13 N2 registered (55 % reduction from 2021).
		Baseline 2019: 23 registered exposures	Reduce by 50% the number of exposures to health hazards in the workplace by 2025	13.0 registered exposures.
Dams			No tailings dams in critical safety condition (emergency level 3) <sup>2</sup> by 2025.	We removed one emergency level 3 tailings dam in 2022: B3/B4 dam (Nova Lima/Minas Gerais).
			Implementation of the GISTM in operations: <ul style="list-style-type: none"> <li>• 90% conformance in 2022;</li> <li>• 100% conformance for tailings storage structures of 'extreme' or very 'high consequence' by 2023; and 100% conformance for other structures in 2025.</li> </ul>	Approximately 90% conformance to GISTM requirements.
		Decharacterize <sup>3</sup> all dams built in the upstream heightening method by 2035, in Brazil.		5 structures decharacterized in 2022 (12 since 2019).

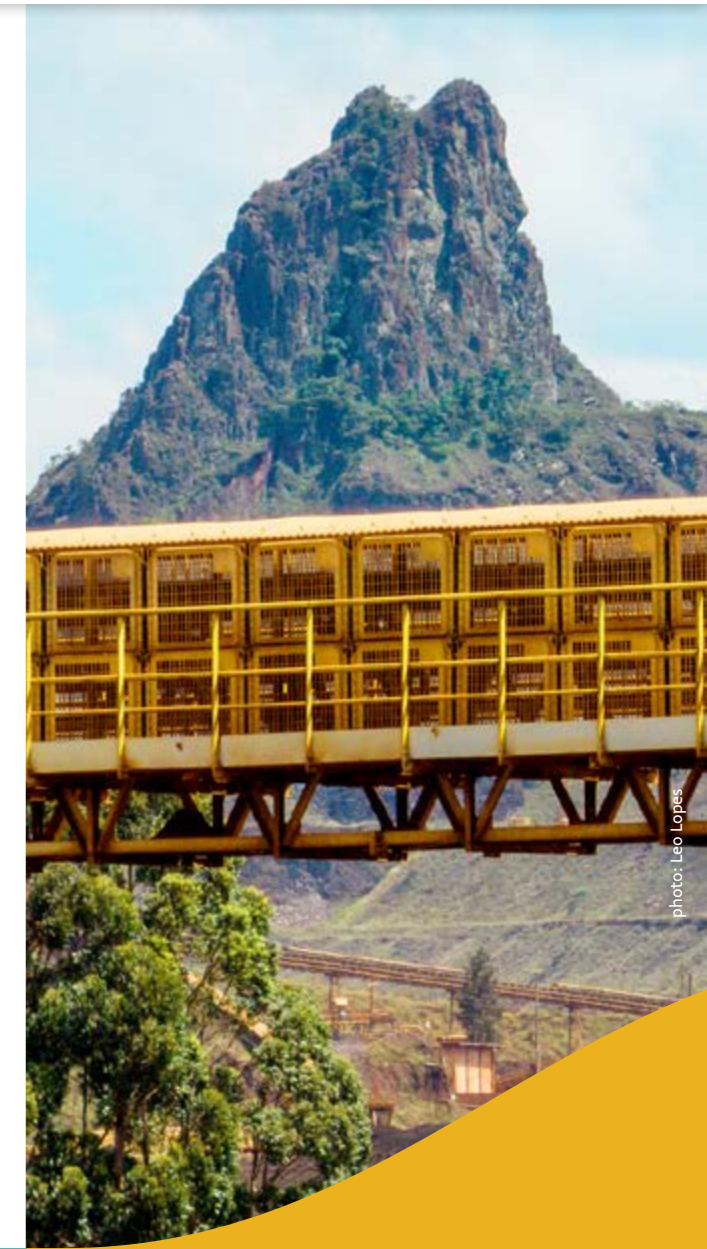


photo: Leo Lopes

Learn more about our [strategy and commitments](#) GRI 2-23

See the historical data at [ESG Databook](#).

1 Consider coordinators and above. Does not consider coordinators.  
 2 The emergency level it is a category established by Brazilian legislation (ANM 95/2022) to classify potential risks that could compromise dam safety.  
 3 The term "decharacterization", according to Brazilian legislation, means functionally reintegrating the structure and its contents into the environment, so that the structure no longer serves its primary purpose of acting as a tailings containment.

## Stakeholder engagement

GRI 2-12 | 2-25 | 2-29

We believe that dialogue and active listening lead to the creation of positive impact and build sustainable mining practices and outcomes. That is why we have established stakeholder relationship processes with our main stakeholders.

### Stakeholder

### Communities



### Employees



### Customers



### Suppliers



### Why we engage

To share knowledge about our work and its risks and impacts, listening, understanding, and acting in relation to the perceived impact and to the expectations of the communities, providing opportunities for local development.

To promote topics including commitment to performing our activities safely, respecting the environment and people – our own employees, contractors, suppliers, and communities.

To better address market demands related to the quality of our products, aligned with our strategy of reducing carbon emissions throughout the production chain.

To emphasize our demand for agility in the purchase of materials and services; the correct choice of items; materials inventory management; and the health, safety, and sustainability variables in our supply chain.

### How we engage

- Community relations plans;
- Formation of management groups and participatory meetings;
- Visits to the communities, forums for monitoring actions;
- Grievance mechanism – capturing, recording, processing, and responding to community complaints and requests;
- Including the concept of progressive closure throughout the life cycle of our operations, from the preliminary design and licensing phases.

- Internal communication (360, webinars, Vale@, Management Newsletter, Intranet, Teams Card, among others);
- Qualifications, training, and academia;
- Thematic groups, interactive dialogue, joint action and volunteer programs, collective bargaining with unions and/or workers' bodies.

- Commercial meetings, technical meetings, visits, contacts via emails and phone calls, Customer Portal, satisfaction survey, forums, seminars, and conventions.

- Low carbon forum;
- Supplier chat;
- Business rounds;
- Training, risk management in human rights and workshop with global category suppliers;
- Inove Capital Portal – web environment that helps suppliers to access working capital loans.

### Main demands and concerns

- Local development agenda (support for social projects and job openings) and mitigation of social impacts and human rights violations;
- Management of impacts and the reparation of Brumadinho (transportation, access to water, care, animal rescue and indemnity);
- Concern for community safety with respect to fatal and non-fatal injuries affecting community members;
- Techniques for environmental restoration and reforestation after mine closure.

- People management practices;
- Decent working conditions;
- A diverse, inclusive, and psychologically safe environment;
- Freedom of association and collective bargaining;
- Management of risks, impacts and opportunities related to tailings dams;
- Management of risks and opportunities in health and safety;
- Innovation (investments in R&D, automation, robotization, and artificial intelligence).

- Dam management (policies, commitments, risks, impacts and opportunities);
- Eco-efficient production and distribution technologies;
- Techniques for environmental restoration and reforestation after mine closure;
- Products and technological solutions to reduce Scope 3 emissions;
- Carbon capture and storage systems.

- Dam management (policies, commitments, risks, impacts and opportunities);
- Local communities (risks, impacts and opportunities, objectives, goals and results of management practices, as well as outstanding projects);
- Investments in innovation and R&D and in ecoefficient production and distribution technologies;
- Techniques for environmental restoration and reforestation after mine closure.

2/2 →

Stakeholder

Investors



Partners, academia, experts, and non-governmental organizations (NGOs)



Public Agencies



Press



Institutions



Why we engage

To reinforce our commitment to the company's financial performance and to creating shareholder value.

To establish partnerships and proximity with experts in various areas and expertise.

To maintain frequent relationships guided by the principles of Public Administration. Active in political decision-making process and the formulation of public policies of which the business is both highly regulated and dependent on. They are relevant because they influence Vale's regulatory and/or normative risks, in addition to acting directly in the process of obtaining authorizations, grants and licenses to which the company and its businesses are subject.

To be accountable and exercise transparency in the relationship with stakeholders, as well as image and reputation management.

To promote engagement and relationships with key entities focused on sustainability issues, analysis and mitigation of geopolitical and socio-political risks, the discussion of public policies, sustainable development initiatives and responsible investments, and promote the interests of the sector globally.

How we engage

- Letters, meetings, questionnaires, general meeting, webinars, conferences, roadshows, calls, ESG Portal, IR website and email, Board of Directors engagement.

- Meetings and events;
- Panels of experts from the Vale Foundation and the Vale Cultural Institute;
- Sounding Panel – advisory board, under the Executive Board, composed of global ESG experts.

- Strategic, political-institutional and technical meetings;
- Thematic Groups and events, and action through sectorial entities.

- Relationship with the media outlets, answering requests for interviews with Vale executives and for information about the company's business and operations.

- Strategic, political-institutional and technical meetings;
- Thematic Groups, external forums, and actions through sectorial entities globally.

Main demands and concerns

- Business performance;
- Capital allocation;
- Long-term strategy;
- Ore, nickel and copper market;
- Good corporate governance (independence and transparency), environmental (water and biodiversity impacts), and social (labor and community safety, human rights, and local community relations) practices;
- Climate change and business model impacts, innovations in applications, and GHG emissions management;
- Tailings dam management;
- Reparation at Brumadinho and Mariana;
- Innovation (life cycle of metals and ores, techniques for environmental restoration and reforestation after mine closure) and ecoefficient production and distribution technologies.

- Cultural transformation and greater transparency about challenges with civil society;
- Communities: from community investment and human rights to dam and mine closure impacts;
- Innovation (life cycle of metals and ores, techniques for environmental restoration and reforestation after mine closure) and investments in R&D;
- Reparation at Brumadinho and Mariana;
- Exploration in sensitive areas for biodiversity.

- Legal compliance in social, environmental, and production methods;
- Reparation at Brumadinho and Mariana;
- Tailings dam management (risks, impacts and opportunities);
- Innovation (topics such as life cycle of metals and ores, techniques for environmental restoration and reforestation after mine closure) and investments in R&D;
- Topics on the agenda for the year: mining waste, water, particulate emissions, conflicts with communities, and mine closure.

- The responses occur both reactively – when the journalist seeks information about the company's different issues – and proactively, based on positive agendas driven by the Press Office;
- Reactive agendas: issues about business, reparation, and dams are the most common;
- Proactive agendas: the main subjects are the sustainability agenda (carbon and biodiversity), culture, innovation, and diversity.

- Environmental (climate change, mining waste, biodiversity and water resources), social (impacts on local communities and human rights, and the vulnerability of these populations, including at mine closure) and governance (cultural transformation and promotion of ethics and transparency, as well as for reparation at Brumadinho and Mariana) best practices;
- Management of risks and opportunities in dams, biodiversity, human rights, and local communities.



photo: Leo Lopes

**In this chapter:**

- Human Rights
- People
- Reliable operator
- Dams
- Reparation
- Social performance
- Voluntary investments
- Mine closure and future use
- Nature
- Climate

# 1

# Sustainable mining

# 1. Human rights

GRI 2-23 | 3-3

## What do stakeholders expect from Vale?

Vale's commitments to human rights, and how these are shared with our value chain.

We recognize that our operation and value chain deal with sensitive social and environmental issues, which can have impacts and create the risk of human rights violations. Therefore, our commitment to human rights is directly connected to Vale's strategic pillars and based on respect for people's dignity and integrity.

To guide our actions, Vale has a Global Human Rights Policy, which we have sought to align with international initiatives and standards such as the UN Guiding Principles on Business and Human Rights, the UN Global

Compact, the Universal Declaration of Human Rights, the principles and guidelines of the ICMM and the International Finance Corporation (IFC) Performance Standards, among others.

Online human rights training is mandatory for all own employees and lasts 2 hours. In 2022, 14,000 new employees were trained, totaling 28,000 hours of training. For new contractors, a training video is provided during onboarding, focusing on the main critical human rights issues. For corporate teams

responsible for Security, 223 of our own employees (100%) and 2,710 contractors (97%) were trained in human rights. [GRI 2-24 | 410-1](#)

Vale has voluntary partnerships with institutions working on human rights. As part of the programs developed in 2022, with the support of BSR, the company evaluated the level of compensation of all Vale's direct employees. The result showed that 100% of employees receive a living wage, as per global benchmarks of 'living wage' and according to BSR's methodology.

In 2022, we responded to

**100%**  
of the allegations

(six in total) raised by the Business Human Rights Resource Centre (BHRRC) in respect of controversial issues, as we continue to meet our disclosure commitments.

 Read more at  
[ESG Portal.](#)

## Human rights risk management

Human rights is part of our Integrated Risk Map, which is one of the tools in Vale's risk management process.

In addition, all our risks are assessed for their impact on the human rights dimension, which involves the analysis of critical issues such as poor working conditions and modern slavery, child labor and sexual exploitation of children and adolescents, labor relations violations, violations in

communities, and large-scale human rights violations.

Risks and opportunities are identified through risk and impact assessments conducted by operations and projects; technical visits by the Human Rights team; the results of independent verification (external due diligence) at our operations and those of our suppliers; the results of complaints through our grievance mechanisms (via the Audit process or the Whistleblower Channel); and

the assessment of new ventures (mergers & acquisitions and joint ventures).

Our operations update their assessments of the risk of human rights violations every year, and carry out monitoring as part of the company's risk management process. They adopt prevention and mitigation control measures for these risks and perform

periodic tests with the goal of ensuring their effectiveness.

The probability of occurrence and severity of the impact are checked during the Human Rights assessment. From there, action plans are developed and implemented, along with monitoring, with the goal of reducing the exposure of people and the company to such risks.



The protection of human rights is entering the legislative agenda in several countries. There are initiatives in the European Union, and a number of countries are starting to develop their own legislation, that require companies to conduct due diligence to identify and mitigate negative impacts on human rights. In addition, companies that account for their human rights programs and impacts are increasingly expected to use hard data and indicators to demonstrate their performance. Maturity in the disclosure of ESG information and, above all, of human rights management, are going to be judged by this information and how it is presented."

**Jonathan Drimmer**, BSR Senior Advisor, in an interview as part of Vale's Materiality Review, conducted in November 2022.



photo: Alexandre Rezende

## Due Diligence in human rights

We have committed to performing human rights due diligence at all our operations and critical projects in three-year cycles, with a methodology aligned to international standards on the subject.

In 2022, 10 human rights due diligences were performed, contemplating a total of 22 operations evaluated by a third party specialized in human rights, in operations in the Southeast and South corridors<sup>1</sup>. This concluded the external human rights due diligence process in 100% of Vale's active operations in Brazil. The main results indicated salient issues related to impacts around working conditions, harassment, discrimination, and relations with communities.

There were no incidents of child or forced labor occurring at or involving Vales's operations and suppliers in the most recent due

diligence exercise. However, we recognize this risk as a salient issue and therefore act to prevent its occurrence in our operations and suppliers. [GRI 408-1 | 409-1](#)

Recommendations are made as a result of the due diligence process. Action plans are implemented with preventive and mitigatory controls and corrective measures complementary to those already adopted, with the goal of reducing the exposure of people or the company to any identified risks.

As part of the human rights due diligence process it is also important to evaluate our supply chain. For this reason, in 2019, Vale began a process to verify our supply chain to assess its level of commitment to respecting human rights.

For information about human rights due diligence on suppliers read [Responsible sourcing](#).

## 2. People GRI 3-3

### What do stakeholders expect from Vale?

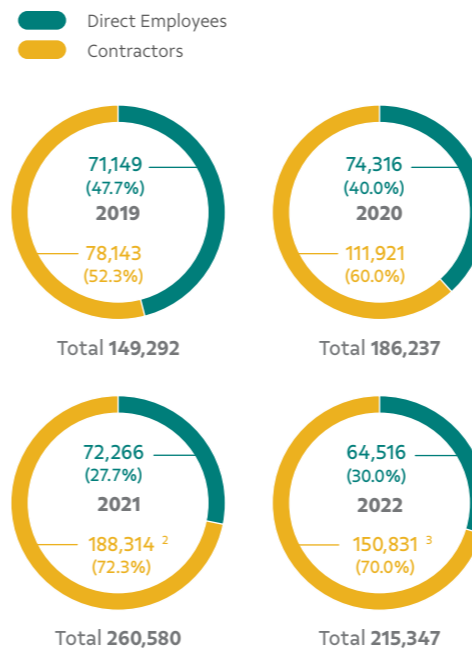
Learn more about Vale's cultural transformation, promoting employee development and diversity.

### "Value the people who build our company" is one of our values.

We understand that people are one of the levers to achieve our purpose. That is why we believe and invest in developing talent, and promoting inclusion and diversity. Safety is an obsession, and the health and well-being of our people is part of that commitment.

We currently have approximately 215,000 employees, of whom about 64,000 (30%) are direct employees and 151,000 (70%) are outsourced, spread over 18 countries. [GRI 2-7 | 2-8](#)

### Employees and contractors



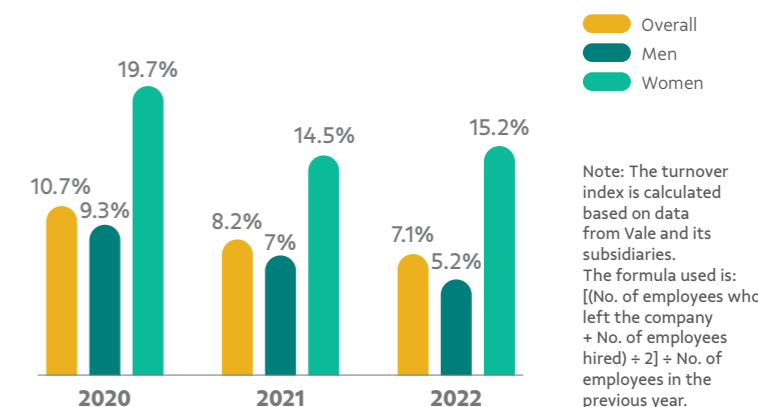
### Employees and contractors by country

Country	Own Employees	Contractors
Brazil	53,341	136,467
Canada	6,561	4,633
Indonesia	3,023	7,278
Malaysia	360	916
Oman	597	1,115
Other	634	422
<b>Total</b>	<b>64,516</b>	<b>150,831</b>

Employees	Women	Men	Total
Direct Employees	14,242 (22.1%)	50,274 (77.9%)	64,516
Permanent	14,154 (22.0%)	50,196 (78.0%)	64,350
Temporary	88 (53.0%)	78 (47.0%)	166

Contractors	Total	%
Permanent administrative and operational contractors	120,706	80%
Temporary	9,207	6%
Permanents	111,499	74%
Contractors in projects	30,125	20%
Temporary	1,498	1%
Permanents	28,627	19%
<b>Total</b>	<b>150,831</b>	<b>100%</b>

### Turnover index GRI 401-1



<sup>1</sup> Corridors are terminologies used for Vale's Brazilian operational complexes including activities from the mine site to the port.  
<sup>2</sup> The number of contractors in 2021 was updated, from a total of 141,147 to 188,314, reflecting the expansion of the definition of contractors in Brazil. [GRI 2-4](#)  
<sup>3</sup> Under revised and equalized criteria, the total number of contractors in 2022 saw a reduction of approximately 20% compared to the total in 2021, mainly in the corporate functions.

## Organizational culture

In 2019, after the Brumadinho tailings dam failure, Vale began a profound journey intended to promote company culture as a catalyst for the business strategy.

During this process we carried out a cultural diagnostic, defined our direction, engaged our employees,

reviewed our main systems and processes and made progress in measuring the results of this cultural transformation.

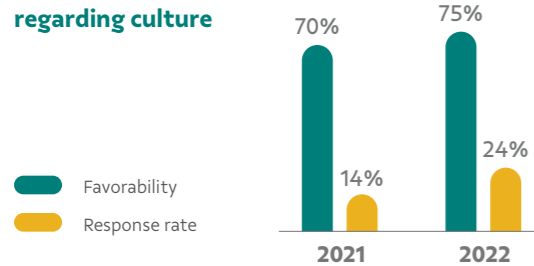
In 2020, we implemented Echoes Pulse, a survey that sought to assess employees' perceptions of cultural transformation. In 2022, we expanded

the measurement methodology via a broad engagement strategy<sup>1</sup>.

In this new format, we began to evaluate the culture, leadership, career, well-being, and belonging pillars in a survey through which more than 24,000 employees (37.5%) were heard.

### Echoes Pulse Results

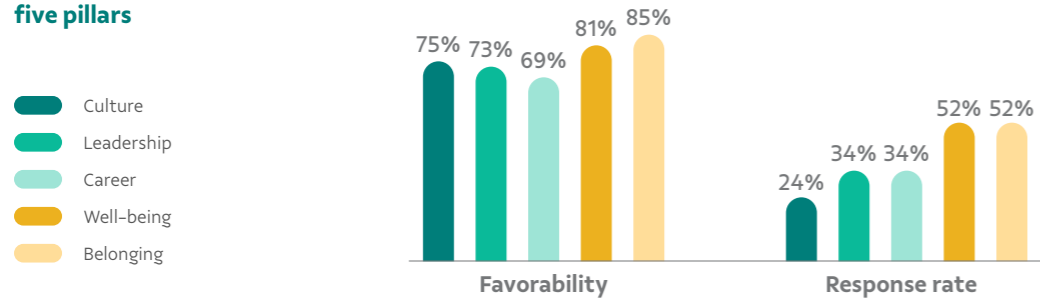
#### Favorability regarding culture



#### Favorability regarding engagement in 2022



#### Favorability regarding the five pillars



<sup>1</sup> The degree to which employees are connected to the company and the energy they have to be protagonists in achieving organizational ambitions.  
<sup>2</sup> The current difference is a maximum of around 2.25 percentage points.  
<sup>3</sup> To pay a living wage means providing the means for an individual/family to purchase the goods and services necessary to attain a basic standard of living (food, housing, education, transportation, leisure, culture, etc.) aligned with the social and cultural expectations of the community and/or country in which the individual is located.

## Compensation

GRI 202-1 | 405-2

Vale respects the local minimum wage defined by legislation, and there is no significant difference<sup>2</sup> in basic salaries between women and men working in the same functions, as guided by the Human Resources Policy. Any variations are due to different levels of seniority and the experience of the employees in their functional category.

Deductions from or restrictions on compensation that could result in the employee becoming indebted to the company are also prohibited.

Vale pays 100% of its employees a living wage<sup>3</sup>, aimed at establishing compensation standards necessary for the well-being of employees and their families.

### Benefits GRI 401-2

The following benefits, which vary according to each country's legislation, are assured: medical and dental assistance; life insurance; private pension plan; personal accident insurance; transportation allowance; educational training; food allowance; and employee assistance program. In Brazil, the benefits are offered to all Vale's direct employees, including those employed on a fixed-term (temporary) or part-time (4/6 hour shifts) basis.



photo: Leo Lopes

### Collective bargaining GRI 3-3

Collective bargaining is a continuous practice in most countries where we operate. Vale respects freedom of association and seek to establish healthy and constructive relationships with employee representatives. Our actions are guided by Vale's Code of Conduct, on local labor legislation, on the eight Fundamental Conventions of the International Labor Organization (ILO) and on the guidelines of the Organization for Economic Cooperation and Development (OECD). In the countries where we operate, when local legislation restricts this right, we strive to maintain dialogue with equivalent employee organizations.

Considering all the countries where Vale operates, 94% of own employees are covered by collective agreements. GRI 2-30 | 407-1

Our direct employees in Brazil have not embarked on a strike since 1989. In this time, we have favored negotiation and the resolution of collective conflicts through dialogue with the unions, and the training of the company's leaders on labor relations issues. The conflicts have been reduced and so has the number of lawsuits involving Vale and unions. The number of employees voluntarily associated with unions has grown. In Brazil, 100% of employees are covered by collective bargaining involving 12 unions, and more than 15,000 are voluntary members of the unions that represent them. GRI 2-30



## Succession plan

Since 2019, Vale's Global Talent Review program has been used to continuously monitor the careers, development, and readiness of successors for critical positions (up to 112 people in 2022) – in the short, medium and long term, with the goal of contributing to the continuity of the business. **GRI 404-2**

In addition, diversity and inclusion are considered: among the 112 critical positions mapped, 72% have at least one woman and 46% have at least one non-white professional mapped out as successors, with the goal of ensuring a diverse leadership pipeline.

## Program Performance in 2022

**In 2022, we reviewed our critical positions: 94% of them have at least one successor mapped out and 55% have successors for the short, medium, and long term.**

We believe that succession planning generates opportunities, retains talent, and develops behaviors aligned to our culture and the VPS management system. The People and Compensation Committee follows up on top leadership's succession planning in quarterly meetings, with reports to the Board of Directors.

## Training and development **GRI 2-24 | 3-3**

Valer, the company's Corporate University, has a structured portfolio of Training and Development interventions, focused on technical, management, and leadership skills.

The courses are geared toward crosscutting topics aligned to the company's strategy, such as security, VPS, risk management and sustainability.

Because we believe that leadership plays a fundamental role in influencing our Cultural Transformation Journey, we have structured leadership training programs and on-demand courses available in the Leadership Academy portfolio that enable leaders to manage talent and be responsible for developing their subordinates.

### Average number of training hours 2022

**GRI 404-1**

Average annual hours by functional category

Category	Hours
Leadership	54
Specialist	33
Technical-operational + staff	90

## Diversity, equity and inclusion **GRI 3-3**

Vale has invested in attracting and developing talent, respecting and encouraging diversity.

We strive to promote an equitable and inclusive work environment. In 2022, we expanded affirmative action for minority groups, generating value and development for the communities in the regions where Vale operates.

Professional qualification programs, career development, and training focused on fighting harassment, discrimination, and prejudice were priorities in the diversity, equity and inclusion (DEI) strategy.



In the last two years I participated, as a consultant, in the Sounding Panel, a series of meetings with Vale's top leadership to discuss issues related to diversity and inclusion of minority groups. The goal was to expand the awareness and listening capacity of the organization's top leadership, providing knowledge and tools for them to promote the transformations needed for Vale to be an increasingly accessible and inclusive company."

**Andrea Schwarz**, CEO of iigual, a consulting firm specializing in the inclusion of people with disabilities in the labor market.

### 2022 results

#### Training and development

**26** classes of the IMPACT program were offered, where

**2,026** leaders, in a cumulative total, have worked on the key behaviors in practice.

**56**

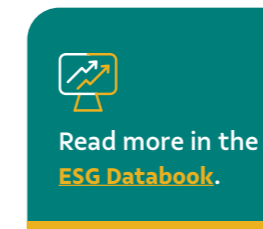
new leaders participate in pilot classes for LEADera, a program that seeks to accelerate readiness to lead people according to the Vale' purpose.

**243**

women leaders participated in the "Inspiring Conversations" initiative, which seeks to support the development of women leaders in their careers at Vale.

**1,740**

frontline leaders have already participated in Cultural Activation, a program that aims to engage them as agents of change for Cultural Transformation. In 2022 we implemented another 77 classes of this program.



Vale has embarked on a fundamental diversity and inclusion journey, embracing the diversity of its people by working towards a fully inclusive and socially responsible organization."

**Janina Kugel**, Non Executive Board Member and former Chief and Human Rights Officer.

## Program/Initiative

### Combating Harassment

#### Target Audience

All employees – Global

#### Objective/Description

In 2022, we intensified actions including:

- Engagements against harassment in operations around the world, with more than 19,000 employees participating;
- [Launch of the Hub Against Harassment](#);
- [React Online Training](#).

### Campaign for attracting women

#### Target Audience

Women – Brazil

#### Objective/Description

Redefining women's careers in the mining industry.

### Mentoring Program for Leaders

#### Target Audience

Women leaders – Brazil

#### Objective/Description

Approximately 380 women leaders at Vale received career development mentoring from renowned market professionals between 2021 and 2022.

### Professional Training Program (PPF) exclusively for women

#### Target Audience

Women from communities where Vale operates – Brazil

#### Objective/Description

Carried out in partnership with Brazil's SENAI network of vocational schools, the PPF offers operational technical training in the careers of equipment operators, industrial machinery mechanics, and electronics maintenance, among others. In 2022, more than 1,200 women were hired through the program.

### Career Acceleration Program for black women

#### Target Audience

100 black women in the job market – Brazil

#### Objective/Description

Developed in partnership with career and race experts, the initiative aims to accelerate the readiness of these professionals to assume more strategic positions in the market.

### Impulse Program

#### Target Audience

100 black women in situations of social vulnerability in the states where Vale operates – Brazil

#### Objective/Description

The program offers professional qualifications for women entering or returning to the job market.

### Empowering Black Talents Program

#### Target Audience

100 vacancies for self-declared black and mixed race Vale employees – Brazil

#### Objective/Description

Accelerate the development of the participants' skills and competencies, increasing their readiness to assume positions of greater complexity in the future.

### Little Africa Circuit – Antiracist Literacy

#### Target Audience

Contractors and direct employees – Brazil

#### Objective/Description

Racial literacy action to increase employees' level of awareness about ethnic and racial issues in Brazil.

### Empowering Talents Program – professionals with disabilities

#### Target Audience

350 vacancies made available in 2022 for employees with disabilities – Brazil

#### Objective/Description

Work on self-confidence and career development for professionals with disabilities.

### LGBTQIA+: coverage of sexual reassignment surgeries

#### Target Audience

Vale's LGBTQIA+ Community – Brazil

#### Objective/Description

In 2021, Vale started offering coverage in its health plan for hormone therapy for gender transition and, in 2022, transsexualization surgeries for the company's trans employees and their dependents in Brazil.

### Vale Pride Celebration

#### Target Audience

Vale's LGBTQIA+ Community

#### Objective/Description

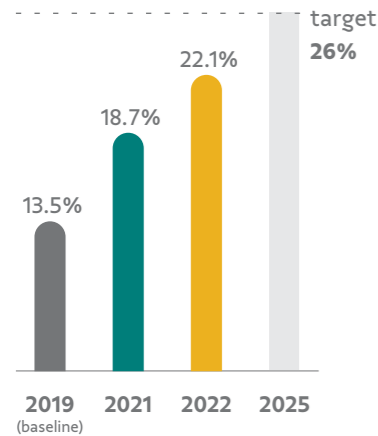
In July 2022, Vale held the second Vale LGBTQIA+ Pride Celebration, which virtually brought together thousands of employees from all over Brazil to celebrate LGBTQIA+ pride and reflect on respect and inclusion for this community.

photo: Zé Palma

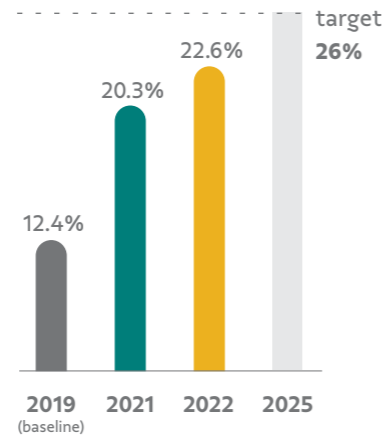


**Diversity Goals**

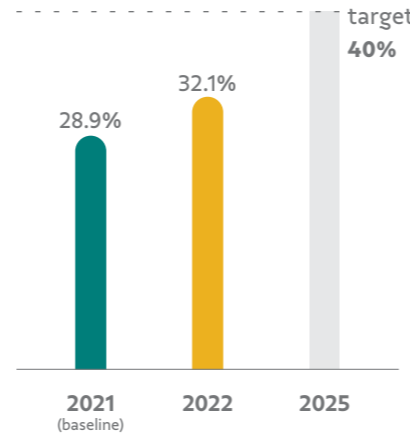
Achieve **26% women** in our workforce by 2025



Achieve **26% women** in senior leadership<sup>1</sup> by 2025



Achieve **40% of leadership positions<sup>2</sup>** in Brazil filled by black professionals by 2026



**Gender equity**

**Women by functional category**

	2019	2020	2021	2022	Progress in the year
Staff	8,457	10,638	12,433	13,110	5.4%
Supervision	239	374	412	426	3.4%
Managers and coordinator	329	397	598	631	5.5%
Executive Managers and Directors	25	34	45	47	4.4%
<b>Total</b>	<b>9,050</b>	<b>11,443</b>	<b>13,488</b>	<b>14,214<sup>3</sup></b>	<b>5.4%</b>

**Proportion of women by functional category**

GRI 405-1

	2019	2020	2021	2022
Operational technicians	8.7%	11.2%	13.4%	17.1%
Professional technicians (senior level staff)	33.8%	36.8%	38.2%	40.6%
Supervisors	9%	12%	13.5%	15.5%
Managers and coordinator	18.8%	20.3%	24.3%	26.5%
Executive managers and above	12.4%	15.9%	20.3%	22.6%

See more information in the [Diversity, Equity and Inclusion Report](#).

- 1 Executive managers and above.
- 2 Coordinators and above including technical specialists.
- 3 Data do not include companies that have an independent Human Resources structure (2022: Tecnoed, represents 0.13% of the professional staff).
- 4 The name "Capitão do Mato" dates back to a character of the Brazilian colonial era, whose main function was to recapture enslaved people (several times, in the bush) with extreme violence. And its use, regardless of context, is still a racist term.
- 5 Brazilian legislation establishes a minimum quota of PCD employees. Companies with over 1001 or more employees, must fill two to five percent of their positions with rehabilitated beneficiaries, or People with Disabilities (PWD).

**Ethnic and racial equity**

One of the commitments we have made to the ethnic and racial equity agenda is to have 40% of our leadership (coordinators and above) in Brazil made up of black employees by 2026. In 2022, we reached 32.1%, an advance of more than three percentage points over 2021.

We strive every day to fight racism in all its forms as we recognize that our role in society goes far beyond mining. Among such initiatives, is the process of changing the name of the "Capitão do Mato"<sup>4</sup> mine and dam, located in the Vargem Grande Complex, in Nova Lima, Minas Gerais. This is a name with racist connotation and the change reinforces our belief that fighting discrimination and promoting racial equity must happen in all environments and locations where we operate. "Horizontes" (Horizons) was the new name elected in a vote held among employees of the operation.

**People with disabilities**

As a result of the efforts made to increase the representation of people with disabilities (PWD) in our workforce, the Public Ministry of Labor



recognized Vale for the achievement of a 5.4% quota of professionals with disabilities in the total workforce of Vale S/A, exceeding the quota established by law<sup>5</sup>, which has historically been a challenge for Brazilian companies.

We also started the Accessibility Job Mapping Project to improve the inclusion and career experience of professionals with disabilities within the company. The pilot was conducted at the Brucutu and Exploration CDM units in Minas Gerais, and the Portos Sul units in Rio de Janeiro, where analyses and evaluations of functions, as well as an accessibility analysis of workstations, buildings, and surroundings were performed.

**Gender equity**

In line with our goal of doubling the representation of women in the workforce by 2025, Vale ended 2022 with over 5,000 more women in the workforce compared to December 2019. Since we made our commitment to gender equity in 2019, the number of women in senior leadership positions has increased by 88%. Since 2020, the Global Trainee Program has contributed to training Vale's future leaders and prioritizing talent diversity. Among the 113 trainees selected in 2022 in Brazil, 67% are women and 71% identified themselves as black or mixed race.

The data shows our evolution, which has been a constant challenge to reach a position where DEI is a mature, effective and central practice for our business.

# 3. Reliable operator

## What do stakeholders expect from Vale?

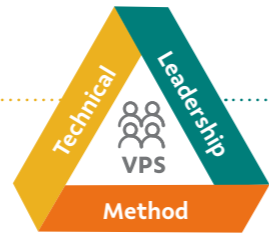
Taking measures with the goal of ensuring and more reliable operations.

## Vale Production System

The Vale Production System (VPS) management system is one of the levers which supports our aim to become a benchmark in safety, and the best and most reliable operator. The VPS seeks to strengthen Vale's organizational culture through people development, standardization of best practices, operational discipline and routine compliance. Its application is mandatory for the whole of Vale, with global adoption in the operational and administrative areas. As a result of its implementation, we aim to achieve better safety rates, greater employee engagement and better reliability of critical assets.

Driven by the generation of sustainable results, the system provides for the implementation of management practices and methods that enable safer and more environmentally responsible operations, while also ensuring the integrity of company assets.

### The VPS has three dimensions



#### Technical.....

Policies, guidelines, and common technical process requirements for managing assets and addressing inherent business risks.

#### Leadership.....

Practices expected to reinforce key behaviors and shape organizational culture and discipline.

#### Method.....

Management routines, methodologies, and tools expected to sustain and improve results.

The minimum compliance requirements for these dimensions and their elements are verified annually in formal assessments.

Read more at [Portal ESG](#).

## Health and safety GRI 3-3 403

Our Health and Safety strategy is supported by the VPS and exemplifies our value of "Life comes first". It is based on three pillars: prevention of injuries and chronic diseases; prevention of fatalities; and prevention of catastrophic accidents.

We strive to align our occupational health and safety goals with international standards, allowing us to monitor the evolution of this strategy and the search for market best practices and results. Our main objective is to keep people at the center of our decisions, promoting the physical and mental wellbeing of our employees and maintaining a healthy environment suitable for the development of our business.

### Accidents and fatalities GRI 3-3 | 403-9

In 2022, there were 19 events in our operations classified as under categories N1 – fatalities or changed lives (6) and N2 – lost time, restricted work or medical treatment cases resulting from high potential events (13). This is a 44% reduction compared to 2021, representing the third consecutive year of improvement in safety results.

Despite this, regrettably, in 2022 there were five fatalities at our operations. Internal investigation processes were

followed for all of these incidents, with independent executive leadership and the involvement of global experts on the topics as well as employee representatives. The processes also ensure that learnings are shared through global webcasts and, as the investigations progress, comprehensive preventative actions are defined with mandatory compliance by all areas.

All strategic actions aimed at the evolution of our safety system seek to prioritize the elimination of high potential events.

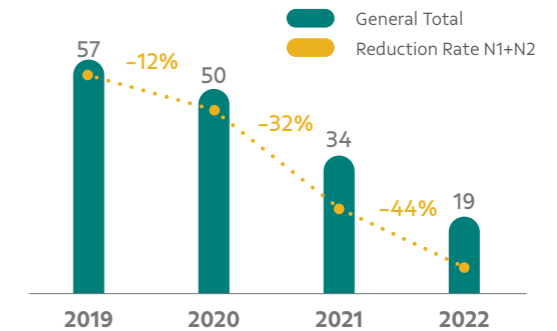
### Occupational health and safety management GRI 403-1

Our strategy to reduce High Potential Accidents has shown significant results in the reduction of injuries and the rate of recordable accidents.

As part of the VPS management system, we highlight specific elements geared towards Occupational Health and Safety, comprising initiatives aimed preventing and mitigating risks, promoting the continuous improvement of safety, and encouraging the safety of our employees.

Periodic evaluations are undertaken based on risk criteria defined according to the nature of the

### Historical N1+N2<sup>1</sup>



Note: N1 – fatalities or lives changed | N2 – high potential events.

<sup>1</sup> The chart considers only the N2 information for Brumadinho, and does not consider the N1 data.

### Fatalities in our operations

Year	Direct employees	Contractors	Total
2019**	1 (131)*	1 (119)*	2 (250)=252
2020	1	3	4
2021	1	1	2
2022	3	2	5

\* Includes the Brumadinho dam failure.

\*\* The criteria used for 'fatalities' in this cycle has adjusted to include victims from the Brumadinho dam failure that have been found and those who remain unaccounted for. GRI 2-4

activities and the maturity level of the VPS elements associated with health and safety.

Identified deviations are intended to be reported and addressed in order to promote the continuous improvement of the management system and are monitored by Vale's governance bodies, which includes the Executive Committee, the Sustainability Committee and the Board.



photo: Vale PTVI archive

## Health and safety goals

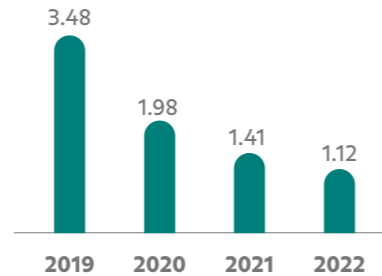
- Zero fatalities.
- Reduce the number of exposures to health hazards in the workplace by 50% by 2025. In 2019, we had 23,000 occupational health and safety exposures and ended 2022 with 13,000 – a reduction of 43%. The goal is to reach 11,500 exposures by 2025.



### Total accident rate (TRIFR<sup>1</sup>) employees and contractors

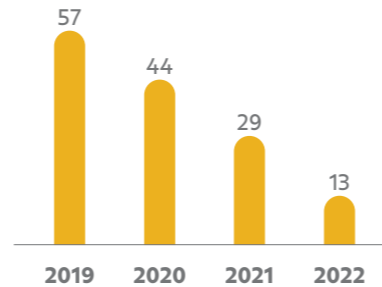
(Per million hours worked)

Note: These numbers show that in recent years, Vale has significantly reduced the accident rate.



### Reducing recordable high-potential injuries<sup>1</sup>

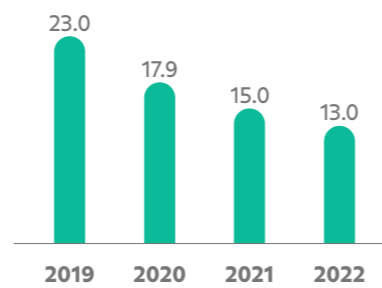
Note: These numbers show that Vale has continuously reduced the number of high potential injuries. Such events could have had a serious adverse impact on safety and health and are generally considered to be indicators of precursors to fatalities.



### Reducing the number of exposures above the Occupational Exposure Limit (OEL)<sup>2</sup>

(In thousands of exposures)

Note: The number of exposures is calculated as the sum of the number of exposures above the Occupational Exposure Limit (OEL) that occurred at Vale Global during the year.



<sup>1</sup> TRIFR = (Occupational injuries / Hours worked) \* 1,000,000

## Key Health and Safety initiatives



### Process Safety Management (PSM):

we integrate process safety into our VPS management system and actively embedded this concept within the mining business through the guidance of Brazilian Mining Institute (IBRAM), the ICMM and the Center for Chemical Process Safety (CCPS).



### Technical Standards of Asset Integrity (PNR):

mandatory normative standards applicable to the asset's entire life cycle. The PNRs consider the requirements of the VPS, international standards, best practices, statistics, the product of HIRAs (Hazard Identification and Risk Assessment), lessons learned from accident histories, and external consultations by engineering and process safety companies, among others.



### Safe Work Permit (SWP):

the process encompasses the pre-planning, planning, scheduling, and execution stages of a given task through prior knowledge of the risks and definition of the controls. The SWP is being implemented across a wide variety of operations and projects, aiming to protect those performing tasks that involve high or very high risk.



### Critical Activity Requirements (CARs):

CARs establish mandatory requirements that must be implemented by leaders in their respective areas of activity and processes, whether they are performed by Vale employees or service providers, on the following topics: working at height; light motor vehicles; operation of mobile equipment; blocking, identification and zero energy; load hoisting; confined space; machine protection; ground activities; explosives; working with electricity; and liquid metal.



### Exposure to health risks:

a global corporate guideline was established for the management and development of monitoring and control programs for employee occupational health, including quantitative objectives for the reduction of health risk scenarios in the medium term.



### Prevention of disability:

in 2022, we moved a step further toward preventing cases that lead to employee disability. Musculoskeletal, mental and behavioral disorders are the leading risks, both in Brazil and worldwide. The guidelines include a list of tools to conduct integrated, individual and collective health management, as well as to promote quality of life. More recently, a specific approach to the topic of emotional health has been incorporated to mitigate psychosocial risk factors.

## Technology that saves lives

### Safety Transformation Program contributes to the reduction of high-potential events

Created in late 2020 for the purpose of accelerating health and safety outcomes through the use of technology, the Safety Transformation Program contributed positive results in 2022, by ensuring the technological adequacy of critical activity requirements in motor vehicles, mobile equipment and power blocking (CARs 2, 3 and 4) and by the practice of sensing and remote operation in Dams Self-Rescue Zones (ZAS)<sup>1</sup>. These results included:

- an approximately 55% reduction in high-potential events<sup>2</sup> with motor vehicles (CAR 2), mobile equipment (CAR 3), and power interruption in 2 years (CAR 4);
- more than 50,000 people protected;
- more than 95% overall adherence to CARs 2 and 3 (motor vehicles and mobile equipment);

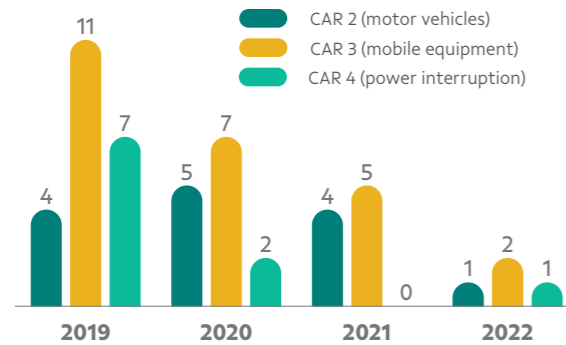
In addition, the Program contributed to protecting more than 50,000 people with the following actions:

- 11,000 security devices installed in our equipment and/or facilities;
- more than 400 electrical rooms were equipped with systems to allow identification and blocking of electrical arrays;
- deployment of the world's first remote silo operation at the Carajás operating dam promoting the removal of people from the Self-Rescue Zone (ZAS) and the maintenance of the operating license.

The Program still has many challenges to overcome by 2025, such as continuing to accelerate the adaptation of the CARs, relocating 100% of fixed workstations in the ZAS and ensuring 100% visibility of people in risk areas.

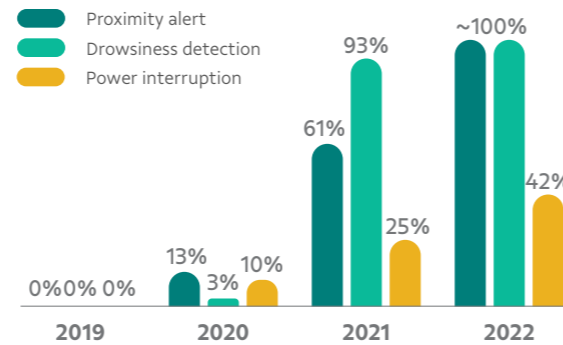
### Reduction of high potential injuries

Impact: N2



### Safety Transformation Program

Accelerating adherence to CARs



<sup>1</sup> Self-Rescue Zones: Area where individuals may gather in the event of an emergency, and when there is not enough time for the competent authorities to intervene in an emergency situation. The criteria adopted to determine distance corresponds to the time of arrival of the wave of a potential dam breach of thirty minutes or 10 km from the structure.  
<sup>2</sup> N2 events, according to Vale terminology.

## Safety in communities

In some situations, our operations may pose a physical risk to people living in the vicinity. To that end, from the moment an event is reported, we are committed to involving the communities in discussions about the implementation of actions to mitigate the risk of recurrence of these events. These events are safety events with social loss – that result in injuries to people not employed by Vale and which occur in areas for which Vale is responsible, or external areas (as long as they are in the course of production or provide activities that support production).

These events are considered independently of the possible civil or criminal liability of those involved and are aimed at identifying the causes of the event and the actions needed to avoid their recurrence. These can be a wide range of events, from collisions between Vale vehicles and motorcyclists from the community, to railroad collisions.

The goal for 2022 was to reduce the number of events affecting community members by

10%, and the result achieved was 8.7%. There was a 32% reduction in fatal injuries. In 2023, the goal is to reduce the occurrence of injury events affecting community members by 10% compared to the 2022 result.

Among the actions that contributed to the reduction of events, we highlight the improvement of tools used for monitoring and recording occurrences and of the regulations related to the management of security events with communities. In addition, a more effective risk management process has been carried out through the Integrated Community Safety Plans, which have an integrated approach to all local operations present in an area.

The results obtained in relation to the safety target in communities have a direct bearing on the variable compensation of our executives, in an innovative and pioneering initiative to give concrete foundations to our value of life matters most.

Read more: [Leadership Compensation](#).

### Community Safety Event Register<sup>3</sup>

	2021	2022	% Reduction
Fatal injuries	25	17	32.0%
Non-fatal injuries	98	85	13.3%
Total events with injury to community members <sup>4</sup>	104	95	8.7%

<sup>3</sup> The 2021 Integrated Report lists 49 fatalities, referring to 2021 (reported in January 2022). However, the baseline established for the variable compensation target for 2022, which also refers to 2021, is 25 fatalities. The difference is explained by I) exclusion of the events that occurred in Coal (19), a business sold by Vale, and II) exclusion of suicides (5). It is important to stress that both fatalities resulting from suicide and those that occurred in Coal remain in the Events with Social Loss Monitoring base, and were excluded only for the purpose of accounting for the results related to the target. GRI 2-4

<sup>4</sup> One event can generate more than one injury. So, the number of events may be less than the sum of the number of fatal and non-fatal injuries.

## Risk management GRI 2-16 | 2-23 | 2-25 | 403-2

Our risk management, which we believe is crucial to conducting our business and supporting the achievement of our strategic objectives, is based on the Risk Management Policy, revised in 2022, which determines the methodologies, guidelines, response strategy, governance, and responsibilities on the topic.

Our risk management is structured under the lines of **defense model**, which is aimed at ensuring robust governance and efficient controls. It is based on some of the main global standards, such as ISO 31000, ISO 55000, COSO-ERM and, for operational safety, the Risk Based Process Safety (RBPS) operational safety management system. Our risk management process considers the present risks (operational and non-operational), business risks, and emerging risks, whose concepts are contemplated in the company's specific norms.

The Advisory Committees to Vale's Board of Directors are charged

with overseeing the scope and effectiveness of risk management. The Risk Executive Committees, whose creation is now the responsibility of Vale's Executive Committee, act in a preventive manner and support the Executive Vice Presidents in monitoring risks and making necessary decisions. There are five Risk Executive Committees, with different scopes of action: (i) Operational Risks, (ii) Geotechnical Risks, (iii) Strategic, Financial and Cyber Risks, (iv) Compliance, Institutional and Communications Risks, and (v) Sustainability Risks [GRI 2-12](#).

The Integrated Risk Map, a non-exhaustive instrument that contains the set of potential risk topics, was re-evaluated and approved by the Board of Directors in July 2022, on the recommendation of the Executive Committee, with the goal of contemplating risks that need to be assessed and monitored in all Vale units.

### Operational risk management program

We use the HIRA (Hazard Identification and Risk Assessment) program for operational risk management. HIRA is designed to map and analyze operational high severity or very high risk magnitude security risks, identify and define performance criteria, and establish the assurance of appropriate critical controls and mitigation plans.

In 2022, we started the second cycle of HIRA assessments (2022 to 2026), covering six operational sites and considering important operational interruption scenarios, which could cause significant financial losses in addition to having consequences for people safety and environmental impacts, already assessed since the first cycle. Over a period of up to four years, all our operations will be reassessed.



Read more details about the process of mapping emerging risks is part of the [ESG Portal](#).

### Emerging risks

Vale seeks to map all of its emerging risks, which consist of new or previously known risks – under new or different conditions and/or circumstances – and those which have a high degree of uncertainty as to their tendency, severity and probability of occurrence. They are usually influenced by external factors, which makes them difficult to predict. We keep an updated list of these risks, validated with top management Vale administration. Examples include:

#### Risks of transition to a low-carbon economy:

- Product substitution due to new technologies and processes
- Changes in supply and demand, specifically for low carbon products
- Changes in policies, including carbon tax
- Climate-related litigations and reputational impacts

#### Geopolitical tension and international sanctions.

### Mapping key emerging long-term risks:

#### Transition risks to a low-carbon economy

Transition risks are those related to technological, market, regulatory and legal or reputational aspects.

Product substitution due to new technologies and processes may result in the advent or discontinuation of some products in our portfolio;

Alterations in demand, specifically for low carbon products, may impact our business, according to the scenario variation;

Changes in public policies, including carbon taxation, may impose higher costs on emitters, which impacts the cost of our products;

Litigation may occur as a result of more restrictive laws and reputational impacts due to consumer and investor perceptions about Vale's approach to the transition to a low carbon economy.

#### Geopolitical tensions and international sanctions

Geopolitical tensions could lead to a protectionist approach, disruption of international trade flows, extreme pricing, high volatility in the markets, with particular impact on the energy sector, and increase regulatory and contractual uncertainty.

They may also lead to a cooling off of the international sanctions scenario by imposing new restrictions on selling or purchasing products, or on conducting business with specific countries, companies and individuals, impacting our production chain.

# 4. Dams GRI 3-3 | G4 MM3

## What do stakeholders expect from Vale?

How we are acting to avoid the recurrence of events like Mariana and Brumadinho.

After the tragic events that surrounded the failure of the tailings dams<sup>1</sup> at Mariana and Brumadinho, tailings dams have become one of the biggest challenges of the mining sector and especially of Vale, due to the risks associated with its existence and the feeling of insecurity in the communities close to the mining operations.

As a priority, we have adopted rigorous management standards, created since 2019, and have committed to decharacterizing all upstream tailings dams in Brazil by 2035, 40% of which have already been removed. We implemented the integrated Geotechnical Monitoring Center, which further contributed to a all dams, 24 hours a day, 7 days a week.

**Read more at:**  
<https://vale.com/en/dams>.

## Tailings and dam management

After the Brumadinho tailings dam failure, Vale moved from a management system based on periodic ratings of stability conditions of the structures – the Dam Stability Condition Statements (DCEs) – to a system based on continuous assessments conducted by third parties (Engineer of Record – EoR) throughout the year.

In addition, there are multi-layer reviews, continuous monitoring and support by an updated management system based on best practices – the Vale Tailings and Dam Management System (TDMS), which was implemented in 2020. These management processes are fully aligned with the new Global Industry Standard on Tailings Management (GISTM).

The system was finalized in 2022 and our geotechnical teams were trained on its use. The TDMS includes the provision of external independent reviewers that augment the levels and layers of internal review: EORs, the Independent Tailings Review Board (ITRB) and Periodic Independent Dam Safety Reviews (RPSB) that support the internal processes of

### Global Industry Standard Tailings Management

The GISTM was created in 2020 from a United Nations Environment Programme (UNEP) initiative with the Principles for Responsible Investment (PRI) and the ICMM, setting a new benchmark for tailings dam safety as the mining industry's first global standard. The standard classifies tailings dams according to their potential for impact in the event of a failure.

[Learn more here.](#)

technical inspections, reviews and performance evaluations. All Vale's dams in Minas Gerais continue to operate under an independent external auditor process as the result of the agreement signed in 2019 with the Public Prosecution Office of the State of Minas Gerais.

As part of the commitment to GISTM implementation and our work to eliminate the gaps identified in the 2021 self-assessment, the GISTM 100 Journey program was established in 2022. By December 2022, our internal assessment indicated we had achieved 90% conformance to the requirements of the GISTM, considering the assessed structures and their consequence ratings<sup>2</sup>. The goal is to achieve compliance for all our tailings storage facilities by 2025. For those classified as of 'Extreme' and 'Very High' consequence, the goal is August 2023.

## Risk assessment

### Goal

**100%** of our portfolio of dams and TSFs undergo Hazard Identification and Risk Assessment (HIRAs) by the end of 2022; and

**100%** are connected to Vale's Enterprise Risk Management (ERM).

**100%** of tailings storage facilities operating with 'Very High' and 'Extreme' potential consequences<sup>3</sup> be GISTM compliant by 2023.

**100%** of tailings facilities GISTM compliant by 2025.

Dam decharacterization plan: **60%** of Vale's upstream dams in Brazil decharacterized by 2025, **90%** by 2029 and **100%** by 2035.



### Status in 2022

**100%** of dams and structures for TSFs with risk assessment according to the HIRA (Hazard Identification and Risk Assessment) methodology.

**100%** of the dam portfolio are connected to Vale's Enterprise Risk Management (ERM).

A work program, the GISTM 100 Journey, is underway toward achieving these goals.

**40%** (12 of 30) of upstream tailings dams in Brazil decharacterized.

<sup>1</sup> Dam also covers EARs (tailings storage structures), considering sediment, water and tailings dams, drained piles and saddle and internal dikes (tailings dams can also be grouped into dam systems).  
<sup>2</sup> 45 structures assessed in 2022, of which 35 in Ferrous (with extreme, very high, high and significant consequence ratings) and 10 in Base Metals (with extreme and very high consequence classifications).  
<sup>3</sup> The consequences of tailings dams are classified according to the GISTM methodology.



photo: Leo Lopes



Business units

Safety & risk

Internal audit and whistleblower channel

Geotechnical Operations Team

Safety & Operational Excellence Office

Compliance Office (Internal Audit And Whistleblower Channel)

1st Line of Defense

2nd Line of Defense

3rd Line of Defense

External Reviewers

Engineer of Record

Dam safety inspections and performance assessments

Independent Auditors

Public prosecutors technical reviews and the Independent Tailings Review Board (ITRB)

Dam Safety Reviews

Periodic technical reviews by external engineering company

Dams and Tailings Storage Facilities

Vale has 140 Dams and Tailings Storage Facilities (TSFs) registered with Brazil's National Mining Agency (ANM) from its Brazilian Ferrous and South Atlantic Base Metals Units, of which:

- 39 TSFs (37 in the Ferrous and 2 in South Atlantic Base Metals Operations) and;
- 101 tailing dams (82 at Ferrous and 19 at South Atlantic Base Metals Operations)

Of the total, 98 are covered by Brazil's National Dam Safety Policy – 91<sup>1</sup> at our Ferrous operations and 7 at the South Atlantic Base Metals operations, and all are subject to the Regular Safety Inspection Report (RISR) on a twice-yearly basis.

In the North Atlantic Base Metals operations, there are 66 dams and TSFs located in Canada (Ontario, Manitoba, Newfoundland and Labrador), all of which have publicly reported their performance against the Canadian Mining Association's Towards Sustainable Mining (TSM) program.

Vale has intensified preventive, corrective and monitoring actions for our structures. Since 2020, we have reduced by one third (from 35 to 23) the total number of structures at emergency level. The emergency level is a category established by Brazilian legislation<sup>2</sup> to classify potential risks that could compromise dam safety.

1 Includes two drained stacks that receive the same legal treatment as dams and TSFs.

2 Resolution ANM 95/2022.

3 Emergency levels are categorized into 1, 2 or 3, determined by increasing risk to the safety of the structure.

4 Critical Safety Conditions.

B3/B4 dam is downgraded from critical safety condition

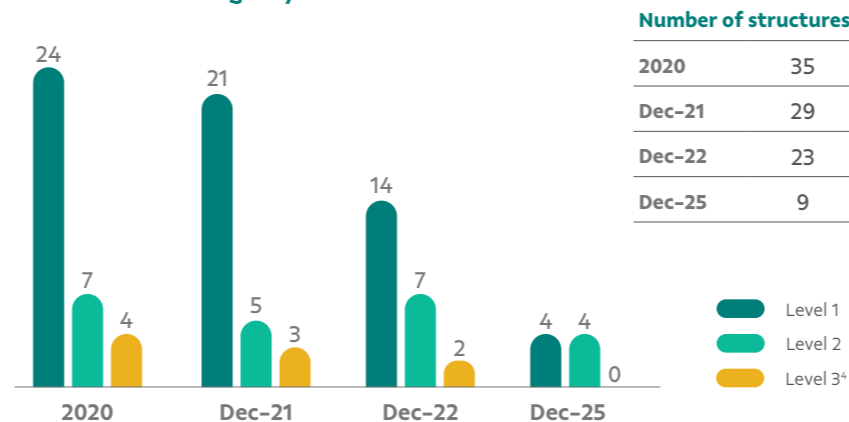
By the end of 2022, the emergency level of the B3/B4 dam in Nova Lima, Minas Gerais, was reduced from 3 to 2. This positive step was possible due to the progress of the decharacterization process with the removal of more than 50% of the tailings from the reservoir, improving the stability conditions of the structure.

As a precautionary measure, the ANM's Resolution 95 directs that the Self-Rescue Zone (ZAS) must

be evacuated at emergency level 2 or higher. This means that the families who have been relocated from the area will not return to the site until it is downgraded to level 1.

Tailings removal works will continue to be conducted by remotely operated equipment and the forecast is to complete the decharacterization of the structure by 2025, two years earlier than initially planned.

Structures at emergency level<sup>3</sup>



Number of structures

2020	35
Dec-21	29
Dec-22	23
Dec-25	9

Agreement provides for reparation

In December 2022, Vale signed an agreement valued at BRL 500 million for reparation work in the District of Macacos in Nova Lima. The parties to the agreement are the Public Prosecutor's Office of Minas Gerais and the State Public Defender's Office, with the participation of the City of Nova Lima and the Federal Public Prosecutor's Office. The goal is to formalize and define the next steps in the reparation work for the community impacted by the evacuations that occurred in 2019 in the interests of the safety of the population, following the increase of emergency level classification for the B3/B4 dam at the Mar Azul Mine.

As agreed, the Integral Reparation and Compensation Plan focuses on income transfer, trade and tourism reskilling, strengthening municipal public services and responding to the demands of the affected communities. Since the increase in the dam level, Vale has already disbursed more than BRL 120 million in emergency payments to the community.

Among other measures, the agreement ensures that the emergency payment to directly affected people will continue for another 36 months, to the value of BRL 77.5 million. Work is also planned for the repair of urban infrastructure, with the recovery of sidewalks and public transportation, as well as support for entrepreneurs and local tourism. Education, security, health, social assistance, and environment will also be covered.

An independent technical audit will be contracted to monitor the results of the agreement, as well as independent technical advisory services to help the affected communities select, develop and present projects for funding.

As a result of this Agreement being put in place, addressing the demands related to collective damages, the Public Civil Action was closed.

## Technological solutions for dams

Investment in new technologies is one of the main paths aimed at increasing safety and reducing the use of tailings dams.

### Natural moisture processing

To replace wet processing and reduce the generation of tailings, Vale has implemented natural moisture processing, making progress in reducing dependence on dams.

### Filtered tailings

Tailings are filtered and disposed of in slurry piles to reduce the use of dams.

### Technologies for monitoring tailings dams and TSFs

Vale's dams are monitored 24 hours a day, seven days a week. High-tech instruments are used to provide accurate data, such as video cameras with artificial intelligence, radar that detect millimetric movements, drones for inspection, piezometers (that measure water pressure) and

geophones sensors (that measure induced and natural seismic waves).

The data is collected in real time and forwarded to the Geotechnical Monitoring Centers (CMG), which are located in Minas Gerais (Itabira and Nova Lima) and in Pará (Parauapebas). Information is analyzed on a continuous basis by technicians. This enables us to check the condition of the structures and take preventive and corrective measures quickly and safely.

### Unmanned equipment

The remote operation of vehicles from outside the risk area increases the safety of employees while performing decharacterization work on upstream dams. Trucks, excavators, and tractors equipped with driverless technology are used. The professional operates the equipment by remote control, in a room equipped with cameras, far away from the tailings dam's risk area.

### Remote Operations Center

An Operations Center has been set up in Belo Horizonte, which allows employees working on the decharacterization process to remotely control equipment kilometers away from the risk area of the most critical dams. Currently all the unmanned equipment used in the decharacterization of the B3/B4 dam, in Nova Lima, is remotely controlled from this center. Further use of the center for operations of other tailings dams is being studied.

### Lifeline/Lift Line Spider

A monicable lifeline system is in place at the B3/B4 dams, at the Mar Azul Mine, and at Grupo, at the Fábrica Mine, as well as at the Forquilhas I and II. In an emergency, it is designed to rescue technicians working on structures by lifting them out of danger. The Lift Lines are controlled by an operator in a suspended cabin and use vertical cables to rescue employees if needed.

### Deep Drive

The equipment performs seismic cone penetration testing (SCPTu) – the seismic wave measurement survey of dams – remotely. Deep Drive reaches a depth of up to 100 meters and has a control cabin connected to a winch system. The solution allows us to remotely conduct the drilling required for decharacterization work, in tailings dams with restricted access.

### Hydraulic driving of steel piles (Gyopress)

The technology was applied in the work of secondary containment (downstream containment structure – backup dams) of the Minervino and Cordão Nova Vista, in Itabira. In this method, the steep piles for the dams are installed by a low-vibration rotating embedding system, without removing existing underground structures, resulting in safer work operations and less risk on nearby communities.



photo: Video Delivery

## Emergency action plans for mining dams

In Brazil, all dams classified with high associated potential damage (DPA) have a technical document that defines immediate actions that should take place in case of emergency<sup>1</sup>. The Emergency Action Plans for Mining Dams (PAEBM), developed according to legal criteria and filed with the Municipal and State Civil Defense bodies, determines that if emergency level 2 is reached, Vale should undertake preventive relocation of the population located in Self-Rescue Zones (ZAS) to safe areas outside the floodplain.

Vale has teams dedicated in implementing the PAEBMs. In order to ensure understanding of the actions outlined in the PAEBM and to clarify how to proceed in an emergency situation, Orientation Seminars/Public Meetings and emergency drills are held annually with the participation of communities located in the ZAS downstream of the dams, employees, civil defense agencies and municipalities. In 2022, 21 Orientation Seminars/Public Meetings and 17 external emergency drills were held<sup>2</sup>.

**Mina do Pico.** Aerial view of the Maravilhas Dam in Itabirito, Minas Gerais, Brazil.

- 1 At the state level in Minas Gerais, the Tailings Dam Safety Policy is more comprehensive determining all structures, independent of their DPA, must have PAEBMs issued.
- 2 In the municipalities of Itabira, Santa Maria de Itabira, Santa Bárbara, Rio Piracicaba, Ouro Preto, Mariana, Barão de Cocais, São Gonçalo do Rio Abaixo, Brumadinho, Nova Lima, Rio Acima, Itabirito, Belo Vale, Jeceaba, Congonhas, Sabará, Santa Luzia, Catas Altas, in Minas Gerais; and Parauapebas, in Pará.

## Dam decharacterization

The decharacterization of all tailings dams and similar geotechnical structures (such as dykes and drained stacks) built by the upstream method is a legal obligation in Brazil.

Vale has already decharacterized 12 out of a total of 30 upstream tailing dams, including five<sup>1</sup> in 2022, all in Minas Gerais, Brazil:

- Baixo João Pereira Dam, at the Fábrica Mine in Congonhas;
- Auxiliary dyke of dam 5, at the Águas Claras Mine in Nova Lima;
- Dykes 3 and 4 in the Pontal System at the Cauê Mine in Itabira;
- Ipoema Dam at Mina do Meio in Itabira.

### Schedule

Due to the technical complexity of dam decharacterization, we signed a Term of Commitment with the Government of Minas Gerais, regulatory agencies, and the State and Federal Public Prosecutor's Offices to establish a new schedule to fulfill the commitment made to society.

The agreement also foresees a contribution from Vale of USD 43.7 million for investments in social and environmental projects, to be disbursed over eight years.

In terms of our Decharacterization Plan:

**90%**

of Vale's Brazilian upstream dams must be decharacterized by 2029.

**100%** by 2035.

One of the pillars of our work in the commitment to non-repetition of events dam failures like Brumadinho and Mariana, is the decharacterization<sup>2</sup> plan for all our upstream tailings dams<sup>3</sup> in Brazil, always seeking to prioritize the safety of people and the environment.

### Geotechnical structures decharacterization forecast by year

#### Number of upstream geotechnical structures (cumulative)

2019 to 2022	12
2023 (Year)	1
2024	3
2025	2
2026	2
2027	2
2029	5
2035	3
<b>Total</b>	<b>30</b>

The tailings removed during the decharacterization process have been deposited in depleted pits and in sterile and tailings piles. In addition, studies are underway to reuse the tailings from the company's facilities, with the aim of providing the material a sustainable destination in strict compliance with the law. One place where this is already being done is the Vargem Grande dam, in Minas Gerais, which is in the process of decharacterization.

The reuse of tailings seeks to reduce the environmental impact of the process by reducing the need for areas where we can safely dispose of the material removed from the reservoirs.

Read more at: [Circular Economy](#).

### Measures for dams at 'emergency level' 3

#### Measures for dams under critical safety conditions

	Sul Superior	Forquilha III
Downstream containment structure (ECJ) <sup>4</sup>	2020	2021 <sup>5</sup>

For the dams at the most critical 'emergency level'<sup>6</sup>, Vale built large containment structures, or back-up dams, that aim to protect the communities living nearby and to make safe working viable.

All the company's geotechnical structures in this situation already have their respective containments completed. This is the case for the South Superior dam at the Gongo Soco mine in Barão de Cocais; for the B3/B4 dam at the Mar Azul mine in Nova Lima; and for the Forquilha III dam at the Fábrica mine in Itabirito.

In 2022, Vale delivered the containment structure downstream of Coqueirinho, which is intended to enhance safety during the decharacterization activities at the Minervino and Cordão Nova Vista dykes, both in Itabira, and with the scheduled to be completed by 2029. In 2022, a total of four downstream containment structures had already been built.

In addition, since work on tailings dams can result in increased risks, residents living in the flood areas – Self-Rescue Zones – of dams at more critical levels were evacuated to temporary residences. See additional information about involuntary resettlement below.

Vale also operates tailings dams in Canada, including upstream structures. However, these structures are not currently part of the decommissioning plan. Our dams in Canada are built to Canadian Dam Association (CDA) engineering standards. Any dams that predate these standards are being upgraded accordingly.

<sup>1</sup> The decharacterization of these structures is awaiting formal validation by the competent bodies.

<sup>2</sup> The term "de-characterization", according to Brazilian legislation, means functionally reintegrating the structure and its contents into the environment, so that the structure no longer serves its primary purpose of acting as a tailings containment.

<sup>3</sup> An upstream structure is a structure raised using the upstream raising method, in which the body of the structure is built using the thick tailings deposited in the reservoir, by successively layering them up and in the direction opposite to the water flow (upstream). This is the same construction method as the Brumadinho dam.

<sup>4</sup> The ECJs were designed to meet the tailings containment requirements of the structures for which they are intended, and adaptations may be necessary. Vale monitors extreme weather events, and when they occur the technical teams are mobilized to evaluate and implement improvements necessary for the adjustment of the structures.

<sup>5</sup> Structure with capacity to retain the tailings from the Forquilha I, II, III, IV and Group, in the case of a simultaneous rupture.

<sup>6</sup> The emergency level is a category established by Brazilian legislation to classify potential risks that could compromise dam safety.

## Evacuated territories

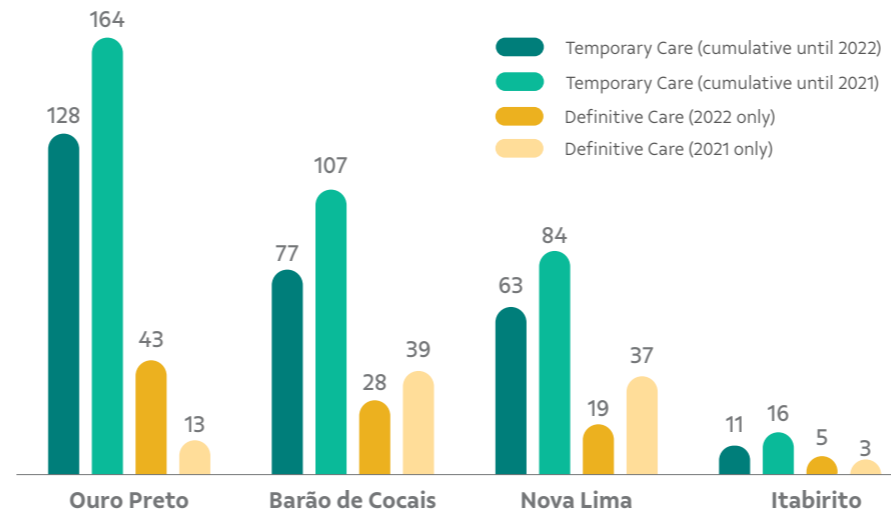
Communities in Self-Rescue Zones at emergency level 2 and 3 were evacuated, and Vale built containment structures intended to protect people and the environment.

In the territories where emergency evacuations (Barão de Cocais, Nova Lima and Itabirito) and preventive evacuations (Ouro Preto) have taken place, Compensation and Development Plans were developed, based on dialogue with the residents and public authorities of each municipality. Valued at a total of BRL 190 million, the plans are aimed at compensating residents

and communities for the impacts caused by the safety improvements underway.

More than 1,200 entrepreneurs have been trained directly and indirectly in the evacuated municipalities through the Horizonte Project, which encourages innovative solutions to the problems faced by residents. Of these, 40 projects are being accelerated and received more than BRL 1.95 million in seed capital to begin work. These accelerated businesses have already earned more than BRL 5 million since the start of the project.

Total families under care due to emergency evacuations/evacuated territories<sup>1</sup> GRI G4 MM9



## 5.Reparation

### What do stakeholders expect from Vale?

Information about reparation measures in Brumadinho and evacuated areas in Mariana, and steps Vale is taking with the aim of preventing the recurrence of this type of event.



Today, we can't recognize our own community. The delay in the removal of the mud, because of the continued search for the unlocated victims, further delays the progress of infrastructure works, within what is considered the 'hot zone'<sup>2</sup>. We know that there is still more to come, but the delays discourage residents and we are left with the feeling that we are not being remedied. Our Association is organized to engage with Vale and the public authorities and through the organization, we have achieved greater awareness of our causes.

We were invited to participate in "Casa Criativa" ("Creative Household"), an economic development project. We hope that with Vale's support through these projects and infrastructure work, especially paving, income generation opportunities and tourism will come to Parque da Cachoeira."

**Vanessa Cristyane de Jesus**, community leader of the Association of Parque da Cachoeira, Parque do lago and Alberto Flores. B1 dam failure – Brumadinho



photo: Gustavo Baxter

We had completed **374** negotiation processes for assistance under the compensation program in areas evacuated as a result of dam risks by the end of 2022.

In the photo, social engagement analyst Edson Cardoso talks with resident Jose Nereu Rodrigues.

### Completed negotiation processes

Municipality	2022	2021
Ouro Preto	171	177
Barão de Cocais	105	146
Nova Lima	82	121
Itabirito	16	19
<b>Total</b>	<b>374</b>	<b>463</b>

Learn more about our work in the evacuated areas of Minas Gerais in the [Reparation Report](#).

<sup>1</sup> The scope of "Evacuated Territories" refers only to emergency evacuations and evacuations/removals due to dam decommissioning works. GRI 2-4  
<sup>2</sup> A hot zone, in Brumadinho, is the most intensely impacted area, composed of the communities of Córrego do Feijão, Parque da Cachoeira, Alberto Flores, Cantagalo, Pires and surrounding of Ribeirão Ferro-Carvão – over 10,000 people live in the hot zone.

## B1 dam failure – Brumadinho

Vale continues to prioritize fully repairing and compensating for the damage caused by the failure of dam B1 in Brumadinho, specifically by implementing the Judicial Comprehensive Reparation Agreement.

We also have a series of other initiatives underway on the water supply, treatment, and monitoring fronts, along with social projects and support for those affected, the support of socioeconomic development, social works, and urban infrastructure.

The search for the victims of the dam failure, carried out by

the Fire Department of Minas Gerais, continues with the participation of the Civil Police, through the Forensic Medical Institute, teams from Vale and family members of the victims. Of the 270 fatalities (including two pregnant women), three have yet to be located.

The extrajudicial individual civil and labor indemnifications reaffirm Vale's commitment to quickly and definitively compensate all those who suffered damage. More than 13,600 people have already signed the indemnity agreement, which represents a value of BRL 3.1 billion.

### Judicial Comprehensive Reparation Agreement

The progress of the actions and the financial payments of the Judicial Comprehensive Reparation Agreement continue according to the legal document signed between Vale, the State of Minas Gerais, the State and Federal Public Prosecutor's Offices, and the Public Defender's Office of Minas Gerais (compliance enforcement agency). With an estimated nominal value of BRL 37.7 billion, the Agreement defines the company's obligations to both carry out and fund the socioeconomic, social and environmental reparations for the dam failure in Brumadinho.

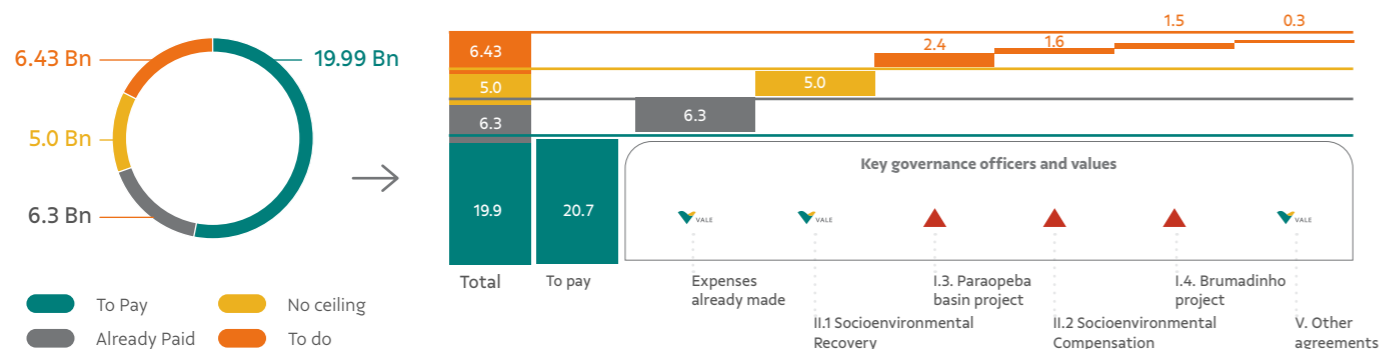
Initiatives for environmental recovery and compensation are

envisaged on the **Social and Environmental Reparation** front. Within the scope of compensation, as defined by the compliance enforcement agency, priority was initially given to the sanitation project in the impacted municipalities, which is being developed by Vale and, after approval, will be executed by the company. Part of the recovery process, the Paraopeba River Basin Social and Environmental Reparation Plan has been under development, since 2019, by a specialized consulting firm hired by Vale, according to the specifications of the State Environmental System (Sisema). It is currently being assessed by the competent bodies and is undergoing revisions.

### Agreement amounts without monetary correction

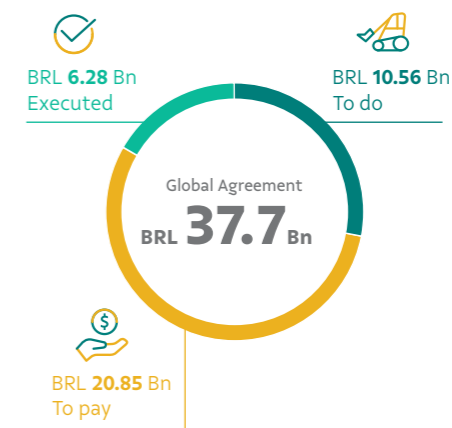
(BRL in billions)

Amounts that make up the Judicial Comprehensive Reparation Agreement (total: BRL 37.7 Bn)



By December 2022, a total of 58% of the Agreement had been implemented, which represents an amount of BRL 23.7 billion, including implementation actions in 2019 and 2020 to the amount of BRL 6.2 billion, considered under the Judicial Comprehensive Reparation Agreement.

Vale has already executed 76% of the forecast obligations defined in the Agreement, corresponding to BRL16.69 billion (value adjusted by the IPCA<sup>50</sup>). The work is being undertaken as a priority, with around 5% of the planned actions (corresponding to BRL 691 million) having been completed, mainly on the Socioeconomic Reparation front. By the end of 2022, 24 projects were underway, nine of them in Brumadinho and 15 in the other 25 municipalities of the Paraopeba Basin, and about 300 initiatives in development. Vale is responsible for running the projects, which are monitored and inspected by the compliance enforcement agency with technical support from the Socioeconomic Audit Department of Fundação Getulio Vargas.



Environmental recovery and compensation actions have been underway since immediately after the failure – including containment, removal and disposal of the tailings, recovery of the Ferro–Carvão stream and the Paraopeba River, environmental recovery of impacted areas and the rescue and care of affected animal life.

The first step for environmental recovery to occur is the removal of the tailings, which is also a critical activity to support the ongoing search being conducted by the Fire Department. Only after the areas are cleared by CBMMG can the environmental recovery work begin, since the search

for the missing people has been a top priority since the dam failure. About 60% of the 12.4<sup>1</sup> million m<sup>3</sup> that are object of removals in the Ferro–Carvão Stream and Paraopeba River have already been handled.

So far, 42 hectares of land are undergoing environmental restoration, including part of the directly impacted area and surrounding protected areas – including the planting of approximately 55,000 native species seedlings in an area equivalent to 42 soccer fields. In this recovery process, the environment is also being rehabilitated, including the recovery of water courses (streams and creeks) and impacted wetlands.

#### Other reparation initiatives

In addition to the Reparation Agreement, a number of other initiatives are underway, which began at the time of the emergency. These are focused on water supply, treatment and monitoring, social projects and support to those affected, socioeconomic development, and social and urban infrastructure works.

These initiatives are guided by dialogue with stakeholders and public agencies focusing on the joint development of solutions that can effectively repair and compensate the impacts.



See more information about the Comprehensive Reparation Agreement at <https://www.mg.gov.br/pro-brumadinho> and <https://vale.com/en/reparation>.

#### Indigenous peoples and quilombola communities

Still within the scope of the Brumadinho reparation process, an Agreement for Collective Full Reparation and Individual Indemnities was signed with the Pataxó and Pataxó Hã–Hã–Hãe indigenous peoples of the Katurãma Village and of the Dona Eline Pataxó group, with negotiations with the Naô Xohã Village and the Gervásio and Antônia groups still pending.

Vale continues to comply with the court injunction for the provisional relocation of the families from the Naô Xohã village that remained in the area affected by the failure of barragem da mina de Córrego do Feijão at Brumadinho.

With regard to the four quilombola communities affected by the Brumadinho dam failure, the Quilombola Component Studies for the Assessment of Impacts and discussions with the communities were initiated to establish reparation measures.



Access the [Reparation Report](#) and learn more about the work done by Vale in Brumadinho and the Paraopeba basin under the Judicial Comprehensive Reparation Agreement and other initiatives.

#### Relationship with the affected communities

Vale has 25 community relations professionals dedicated to the Reparation of the Brumadinho dam failure. We have also made a toll-free number available to provide general assistance to any individual who feels directly or indirectly affected by the Brumadinho dam failure or by preventive evacuations carried out in other territories served by the Special Reparation and Development team.

In 2022, of the 19,786 complaints and requests<sup>2</sup> registered on the Reparation grievance channel: 98.45% were closed, 84.86% answered and 13.59% denied. The main trigger events for the grievances are related to the Brumadinho dam failure and the preventive resettlement and evacuation of areas due to tailings dams at ‘emergency levels’ 2 or 3. For more information see [Dams](#).

Contact can be made through Call Center – 0800 031 0831, [website](#) or through local offices.



### Fundão dam failure and the Renova Foundation

Nineteen people died and many had their livelihoods impacted due to the failure on November 5, 2015 of the Fundão dam in Mariana (Minas Gerais), owned by Samarco Mineração S.A. The dam was operated by Samarco, a joint venture with equal stakes owned by Vale and BHP (50/50).

The reparation of Mariana has been a complex and challenging mission, both due to the breadth of territories impacted by the failure of the Fundão dam and by the widely varying social, cultural, and economic characteristics of the region, which covers at least 39 municipalities in two states (Minas Gerais and Espírito Santo).

Throughout this period, the Renova Foundation, created in 2016 through the Transaction and Conduct Adjustment Agreement (TTAC), a Brazilian legal document, with oversight and support from Samarco, Vale and BHP, has been complying with the commitment to fully repair the damage caused to all those affected, including the environment, through the execution

of 42 programs established with the competent public agencies and authorities.

In August 2018, the Governance Transaction and Conduct Agreement (TAC Gov) was signed, which changed the governance established in the TTAC to a more independent and participatory model, including the participation of local committees created to assist affected people in the indemnity negotiations and the discussion of solutions in the reparation process.

These two agreements (TTAC and TAC Gov) continue to guide the actions of the Renova Foundation. Vale continues to seek swift and comprehensive reparation through Renova’s governance bodies and is open to discussions that may accelerate these efforts. Vale is aware that the speed of the Mariana reparation does not meet society’s expectations and has been providing support for the Foundation with the goal of speeding up this process.

<sup>1</sup> Considering the improvement of geophysical models, the review of base material amounts needed to ease moving heavy equipment over saturated soil and the over excavation necessary to the Minas Gerais Military Fire Service (CBMMG) validate the complete removal of tailings, we are updating the forecasted volume of material to be removed from Ferro–Carvão river bed from around 9 million m<sup>3</sup> to 12 million m<sup>3</sup>.

<sup>2</sup> Figures do not consider complaints and requests received in other locations which are covered in the Local Communities.

## Actions and results in 2022

### Indemnities

Soon after the failure of the Fundão dam, affected people began to register for the payment of Emergency Financial Assistance (AFE), at that time by Samarco itself, and later taken over by the Renova Foundation. Since then, AFE has been paid to more than 14,000 property title holders and about 18,000 dependents, which means that the payment is made monthly to more than 32,000 people.

After the AFE, the Mediated Indemnity Program (PIM) was implemented by the Renova Foundation for the payment of individual compensation. While the PIM has succeeded in compensating more than 10,000 people over its effective term, paying compensation to informal workers such as fishermen, cart drivers, washerwomen, and artisans who had no way of proving the damage caused by the dam breach has proven to be a significant challenge.

Access by these informal categories of work to the compensation process was allowed through a court decision that implemented the Simplified Indemnity System (Novel) in July 2020, having been successively extended by increasing the list of categories and activities

covered and further simplifying the proof required to prove impact. An appeals process was created, allowing claimants denied by Renova to submit their appeal and have their cases reanalyzed by the judicial review. By December 2022, 74,900 people have been compensated by Novel – receiving about BRL 9.08 billion. Considering compensation payments and aid, the Renova Foundation has already paid out BRL 13.57 billion to about 409,400 people.

### Indigenous peoples and traditional communities

The failure of the Fundão dam has impacted the Krenak indigenous people, in the municipality of Aimorés (in Minas Gerais), and the Tupiniquim and Guarani indigenous people, located in the Comboios, Caieiras Velhas II and Tupiniquim Indigenous Lands in the municipality of Aracruz (in Espírito Santo state). The quilombola community of Degredo, located in the municipality of Linhares, was also impacted after fishing was restricted along part of the coast of Espírito Santo.

In 2021, comprehensive reparation agreements were signed, which had been compiled together with the Tupiniquim and Guarani indigenous peoples, respecting both the need for self-determination and the

consultation process. They included the payment of compensation of the order of BRL 390 million to more than 1,600 families, the creation of a program to support the resumption of economic activities directed to eight indigenous associations in Espírito Santo, and a fund for compensating immaterial and collective damages, as well as detailing actions for the Indigenous Basic Environmental Plan (PBAI). In 2022, a negotiating forum was set up to settle disputes in the reparation process and advance the PBAI agenda. Also, during 2022, the Krenak people established their own technical advisory entity, which is in the final stages of registration and formalization. Vale hopes to begin a dialogue to negotiate a full and definitive reparation agreement with the Krenak people during 2023. During this period, the communities continue to be assisted with the payment of emergency aid, water supply, and other support to strengthen local supply chains and increase income generation.

The Degredo Quilombola Community, meanwhile, is awaiting court approval for the implementation, by the community itself through its Local Community Association, of the programs and actions of the Quilombola Basic Environmental Plan (PBAQ). The PBAQ was

submitted to three rounds of public consultations with the community, which approved the 18 social and environmental programs proposed – self-implementation is an important step to guarantee the autonomy of the community in the reparations process for the impacts of the Fundão dam breach.

### Resettlement

The resettlement process relies on the active participation of more than 500 families from the community and on other stakeholders including as justice institutions and government agencies. The process is unique globally, involving the construction of entire communities, with physical structures typical of a city. Parallel to the construction of houses, several initiatives to support micro and small businesses are underway, reaching about 160 families from the resettlements, in addition to school and cultural integration activities, guardianship and protection of rescued animals, among others. All these initiatives make up an integrated solution aimed at the right to housing and securing the livelihoods of these families.

In 2022, an acceleration plan was implemented to speed up the delivery of houses. Engagement actions with affected families

and changes in the management structure the program at Renova have contributed to the evolution in the delivery of resettlement work. Work on the Bento Rodrigues collective resettlement has been at a peak in 2022.

Another important factor that was essential to these advances was the implementation of policies for the restitution of the right to housing that focus on accelerating the processes and the autonomy of the people affected, such as the Cash Payments for Renovations and Cash Payments for Self-Management options. These actions are aimed at speeding up delivery with the goal of ensuring that a large number of families will move into their new homes in 2023.

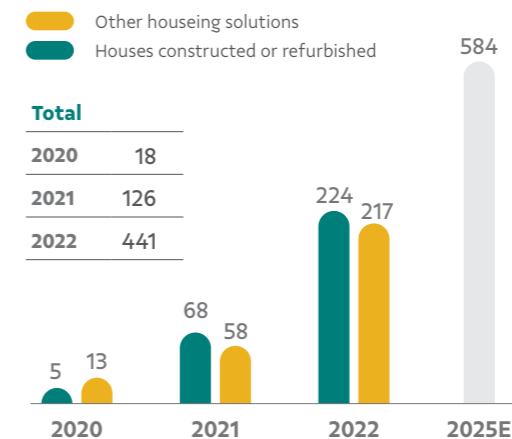
### Results achieved by 2022

By December 2022, in cumulative numbers, 441 housing solutions were achieved in resettlements out of a total of 584 housing solutions planned.

#### Housing solutions

<b>Collective Resettlement of Bento Rodrigues</b>	135 Houses and Lots
<b>Collective Resettlement of Paracatu de Baixo</b>	43 Houses and Lots
<b>Family Resettlement</b>	46 Houses and Lots
<b>Cash Payments</b>	186 Cash Payments
<b>Gesteira</b>	31 Letters of Credit

### All housing solutions delivered by 2025



**441**  
housing solutions  
by 2022

**Commitment:**  
all **584**  
housing solutions  
delivered by 2025

### Water quality

On the environmental front, water quality monitoring continues to be conducted in the Doce, Gualaxo do Norte and Carmo rivers, in addition to other tributaries of the Doce River and the coastal and estuarine zones of Espírito Santo. The results indicate a return to the conditions that existed before the dam breach, meaning that the water in the Doce River can be consumed after being treated without risk to the health of the population.

The process required to make the Doce river water drinkable is the same as would be used to make water from any river in Brazil or around the world safe to use.

### Other environmental indicators

By December 2022 significant progress has been made in compensatory forest restoration, totaling 11,000 hectares of permanent preservation areas and 1,700 springs in the process of recovery. Renova has also made progress in the biodiversity focus area, starting to implement mitigating actions with the goal of conserving aquatic biodiversity. An integrated action plan will also be established, which is slated to include the evaluation of impacts on the terrestrial environment and on the protected areas defined in the TTAC.

In 2022, Samarco continued the restoration of the Risoleta Neves Hydroelectric (Candongá) Plant. Dredging has begun, with material being disposed of at "Fazenda Floresta" with all required

environmental controls in place. By December 2022, about half a million cubic meters of material had been dredged from the reservoir, and its refilling began on December 10. The reinforcement of the hydroelectric plant's main dam was also completed, an important step to provide for the resumption of safe operation.

On March 28th, 2023, the operations at the Risoleta Neves hydroelectric plant were resumed – power generation started in Generation Unit 2. Samarco has already restored Generating Unit 1, which must now just be commissioned in order to be able to operate. Generating unit 3 is currently in the restoration stage.

### Disbursements

Between the failure of the Fundão dam and December 2022, a total of BRL 28.9 billion has been disbursed by Renova Foundation for reparation and compensation work, as well as for administrative and governance costs for TAC Gov.

In order to comply with obligations, BRL 2.4 billion was paid directly by Samarco and the rest of the financial resources were contributed to Renova Foundation in equal shares by the three sponsors Samarco, Vale and BHP. The amounts contributed by Samarco to the Renova Foundation have become more significant in the last two years due to its return to operations and consequent cash generation capacity.

In 2022 Renova received BRL 4.5 billion from Samarco and BRL 3.6 billion from Vale and BHP, spending a total of BRL 8.7 billion on its activities (BRL 8.2 billion on reparatory programs, BRL 0.31 billion on compensation programs, and BRL 0.25 billion on TAC Governance – administrative/governance expenses).

Expected disbursements in 2023 are BRL 8.1 billion, with approximately BRL 6.3 billion<sup>1</sup> more to follow until the end of the Foundation's work.

### Realized expenses from 2015 to 2022 by Renova Foundation (BRL million)

2015	124
2016	1,349
2017	1,770
2018	2,132
2019	2,720
2020	3,644
2021	8,413
2022	8,717
<b>Total</b>	<b>28,869</b>

The amounts spent in the last two years have intensified due to the acceleration of the reparation process, highlighting the compensation, resettlement, and environmental work, among others.

## 6. Social performance

### What do stakeholders expect from Vale?

Information on risk management and impacts on local communities, with an emphasis on the most vulnerable populations and the regional development agenda.

To be kept apprised of Vale's commitments to human rights and how these are assigned across the value chain.

Information on biodiversity recovery, local economic impacts, and the risk of land invasion and misuse.



We need to start thinking of other paths that are no longer linked to the idea of mining associated with devastation, degradation, and violation of rights (...). It is about nothing more than respecting human rights, the rights of indigenous peoples to consultation and dialogue, in an open, frank and honest manner."

**Gersem Baniwa**, philosopher, anthropologist and associate professor at the University of Brasília (UNB) and the Federal University of Amazonas (UFAM), in an interview as part of Vale's Materiality Review, conducted in November 2022.

### Local communities GRI 3-3 | 413-1 | 413-2

Vale's priority is to establish relationships based on respect and trust with the communities impacted by our operations. In 2022, we mapped 1,532 local relationship communities. In Brazil, 165 of these communities are considered an engagement priority. Currently, 78% of these communities have a Relationship Plan in place. Our aim is to cover 100% of these communities by 2026.

In 2022, to gather input on local communities beyond traditional listening channels, we carried out our first

"Community Perception Survey", covering all of Vale's Brazilian areas of operation. The survey sought to identify the level of trust in the company, as well as expectations regarding Vale's presence in the region. The results will be consolidated in 2023 and will support the social strategies for the areas where we operate.



Read more on the [ESG Portal](#)

<sup>1</sup> In March 2023, a court decision determined a judicial deposit in the amount of BRL 10.3 billion, equally divided between Vale and BHP Brasil. The Company will opportunely manifest itself in the process about the decision, against which an appeal is pending.



## Risk management

To map the risks resulting from our operations, we use methodologies, standards and systems in accordance with Vale's risk management process and industry best practice. These tools are designed to assist in the identification, evaluation, mitigation and monitoring of risks. The most common, given our industry, are those related to community safety, conflicts arising from involuntary resettlement and land use, inconvenience to communities (mainly

related to noise, dust and vibration), disputes over natural resources, and damage to roads, highways, and access.

### Grievance mechanism GRI 2-16 | 2-25

Vale's Grievance Mechanism comprises various listening channels, which are the structures responsible for the process of managing complaints. They offer a variety of ways for stakeholders to interact with the company: Alô Ferrovia, Reparation Service Center,

Community Relationship professional, Contact Us, and the Whistleblower Channel. In addition, our Grievance Mechanism is governed by human rights guidelines is designed to comply with General Data Protection Law.

In 2022, 11,085<sup>1</sup> community complaints and requests were registered, of which 99.4% were answered and 84.2% attended to. Of this total, 43.6% were complaints related to accesses, highways and roads, dust, and weeding and pruning.

Read more about our risk management process [here](#).

Read more about our Grievance mechanism [here](#).

Indicator <sup>1</sup>	Total
% complaints and requests resolved	84.2% (9,336)
% complaints and requests responded to	99.4% (11,014)

Indicator/Country	Total	Brazil	Andean America (Peru and Chile)	Oman	Indonesia	Canada	Malaysia	Wales
Communities	1,532	1,156	52	28	206	82	6	2
Indigenous Peoples	26	13	6	-	-	7	-	-
Traditional Communities	47	47	-	-	-	-	-	-
Relationship Plans <sup>2</sup>	455	431	3	3	16	-	2	-
Community Complaints and requests	11,085 <sup>1</sup>	9,779	56	67	975	172	30	6
Brumadinho Humanitarian Assistance complaints and requests	19,786	19,786	-	-	-	-	-	-

<sup>1</sup> For the purposes of this report, the reports registered in the system until January 2, 2023 are being considered. Complaints requested in 2022, but registered after the mentioned cut-off date, will be covered in the report of the next cycle. Furthermore, in the year 2022, 111 manifestations requested in 2021 were registered. Figures do not consider complaints and requests exclusive to the Humanitarian Assistance Brumadinho mentioned earlier.

<sup>2</sup> Annually, communities' 'priority' is updated based on risk, impact and other socioeconomic data. Therefore, the number of Relationship Plans may be different from the number of prioritized communities. In any given year, a community that previously did not have a Relationship Plan may be prioritized and thus require a Plan to be developed.

<sup>3</sup> Community consultation instrument relative to the decision-making process (free, prior, informed consent - FPIC).

## Indigenous peoples and traditional communities GRI 3-3 | G4 MM5

Our relationship with Indigenous Peoples and Traditional Communities is based on respect and adherence to our Human Rights Policy and international standards such as the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). We acknowledge cultural differences and recognize them as opportunities for mutual growth. Our team, which includes more than 20 specialists in issues affecting traditional peoples, receives further external support from indigenist and anthropological consultancies. No violation of the rights of indigenous peoples was recorded.

### Indigenous peoples

In Pará, Brazil, we carried out initiatives and agreements that made it possible to end legal disputes with the Xikrin do Cateté, Kayapó and Gavião (Parkatêjê, Kyikatêjê and Akrãtikatêjê) peoples, and strengthened Vale's relationships with these peoples.

In Maranhão, Brazil, we maintained our relationship with the Guajajara, Awá and Ka'apor peoples through the implementation of the Basic Environmental Plan (PBA). A highlight included the construction of two Indigenous

Basic Health Units in the Januária and Novo Planeta Villages, in the Rio Pindaré Indigenous Land. These new units are intended to integrate the Indigenous Peoples' Health Care Subsystem (SASISUS) network, strengthening the health and protection of a population of about 1,700 indigenous Guajajara people. The initiative was a voluntary social investment by Vale, in partnership with the Special Indigenous Health District (DSEI-MA), with support from Brazil Development Bank (BNDES) Social.

In Minas Gerais and Espírito Santo, Brazil, maintaining our relationship with the Krenak, Tupiniquim and Guaraní peoples saw the implementation of agreements and/or Basic Environmental Plans, as well as the ongoing reparation process with the Pataxó and Pataxó Hã-Hã-Hãe peoples, impacted by the Brumadinho tailings dam failure.

In Canada, we have relationships with nine indigenous peoples in the regions of Ontario, Manitoba, Newfoundland and Labrador. We maintained mutual benefit agreements including an Impact Benefit Agreement (IBA) with the Innu Nation and Nunatsiavut Government in the Voisey's Bay operation and other relationship

processes and formalized agreements with different communities in Sudbury and Thompson.

As part of Vale's Social Ambition of collaborating with the indigenous communities neighboring all of our operations in the preparation and execution of their plans in pursuit of the rights provided for in the UN Declaration of the Rights of Indigenous Peoples (UNDRIP), the Kayapó are the first people to hold a formalized commitment related to the development of a Consultation Protocol<sup>3</sup>.

We continued the Indigenous Program for Opportunities and Permanence at University (PIPOU), which was created in partnership with the Society, Population and Nature Institute (ISPN) – specialists in indigenous higher education and representatives of the indigenous social movement. In 2021, 50 indigenous people (36 women and 14 men) received financial and infrastructure support.

**This year, we launched a new grant to select an additional 55 indigenous students. The selection process is ongoing.**

## Agreement with the Xikrin do Cateté people

The relationship with the Xikrin do Cateté people is intertwined with Vale's history in Carajás (Pará State). In 2022, the indigenous peoples and Vale marked the 40-year anniversary of this relationship at a celebration in the Xikrin do Cateté Indigenous Land, with the participation of Vale's CEO, Eduardo Bartolomeo, and vice presidents and directors of neighboring operations.

After the visit to the Indigenous Land, the indigenous people were also invited to another celebration in Carajás, which once again included the leaders of the Xikrin do Cateté people and Vale. These were special encounters, which reflected the importance of this relationship for both parties. The signing of the Xikrin Global Agreement was fundamental in achieving this result, as it made it possible to conclude the lawsuits that marked previous turbulent periods in this relationship.

Watch the video of the visit [here](#).

Vale CEO Eduardo Bartolomeo, during the visit to celebrate 40 years of relationship with the Xikrin people in Pará (Brazil).



## Exhibition "Nhe'e Porã: Memory and Transformation"

The Vale Cultural Institute, in partnership with the Portuguese Language Museum and UNESCO, held an exhibition in São Paulo on indigenous languages that sought to show other points of view on both the tangible and intangible territories, histories, memories and identities of these peoples. The exhibit included 50 indigenous professionals.

Find out more about Vale's cultural activities [here](#).

## Traditional communities

Together with traditional communities, such as quilombolas, fishermen and coconut breakers, we carry out initiatives with the goal of supporting the ethnic development of these communities within the scope of both the environmental licensing process and our voluntary actions.

In 2022, we developed initiatives with 22 coconut-breaking, quilombola, and riverside communities alongside the Carajás Railroad (EFC) in Maranhão, which benefited from management training for social organizations; digital inclusion; public policy workshops; and strengthening of production chains, among other initiatives. About 3,500 families were impacted by these actions.



## Involuntary resettlement

GRI G4 MM9

Vale avoids involuntary resettlement in the first instance. If unavoidable, we are committed to our goal of ensuring that when involuntary resettlement occurs as a result of our projects or operations (including work resulting from the decharacterization of tailings dams), livelihoods are restored to conditions equivalent to, or better than, those prior to the families' relocation.

This requires measures such as the replacement of impacted land, housing, and economic activities, according to guidelines from international organizations such as the Performance Standard 5 regarding land acquisition and resettlement standard from the International Finance Corporation (IFC), the World Bank, the United Nations (UN), and the ICMM.

In 2022, 1,465 families were involved in involuntary resettlement processes in Brazil and Indonesia. Of this total, 462 families are already in final housing and another 356 are in temporary housing, with all the expenses necessary for adequate housing covered under the company's remit. Socio-economic survey was conducted to subsidize project alternatives to avoid and/or minimize future involuntary resettlement of 647 families.

**Total number of families involved in involuntary resettlement processes** GRI G4 MM9

Region	Triggering event	Total	Under assessment	Temporary Care	Definitive Care	Description
Brazil Minas Gerais	Brumadinho Dam Failure	53	0	40	13	Families involved in the involuntary resettlement process due to the failure of the B1 Dam in Córrego de Feijão.
	Decharacterization of dams	412	38	279	95	Dam decharacterization projects require the evacuation and involuntary resettlement of families occupying areas downstream of the dams to help ensure the safety of the communities. Of the total of 412 families, 374 were relocated because of emergency evacuations and 38 were registered for decharacterization of the Pontal System in Itabira.
	Impacts of Projects	109	70	35	4	Families involuntarily resettled to allow access to areas necessary for work installations and expansion. Of the total of 109 families, 39 are receiving care as a result of the installation of projects in Brumadinho.
	Land Regularization	36	35	0	1	Families in the process of involuntary resettlement due to the loss of informal employment opportunities in areas for which Vale is responsible.
	Structure instability	3	0	2	1	Involuntary resettlement with the goal of mitigating the risk to families caused by slope instability at the EFVM and Olhos D'Água Terminal in Belo Horizonte.
Brazil Pará Maranhão	Impacts of Projects	88	1	0	87	A total of 31 families resettled due to construction on the Tocantins Bridge. A further 56 families of those affected by the involuntary resettlement carried out for the installation of the Onça Puma Mine received definitive assistance.
	Land Regularization	52	52	0	0	A total of 52 families have been identified as possibly impacted by involuntary resettlement and land regularization of the area neighboring the Ponta da Madeira Port Terminal in São Luis.
Brazil Espírito Santo	Impacts of Projects	451	451	0	0	A total of 451 families have been identified as possibly impacted by involuntary resettlement as a result of the EFVM Anchieta Branch Line project. Vale is looking for ways to minimize the number of families impacted.
Indonésia	Impacts of projects	261	0	0	261	Total of 261 families relocated as a result of the Dongi and Lembo South projects in Indonesia.
<b>Total</b>		<b>1,465</b>	<b>647</b>	<b>356</b>	<b>462</b>	

**Land use disputes** GRI G4 MM6 | G4 MM7

Some of our projects and operations are located in regions that experience land use conflicts. The most significant conflicts occur as a result of the dependence on company land by third parties, either for housing by local communities or for access to natural resources, and are found in the state of Pará, in northern Brazil.

In the municipality of Canaã dos Carajás, the surrounding areas of the Southeast Pará Railroad require the regularization of land property rights in exchange for the release of 650 families from the domain strip on seven of Vale's properties. Negotiations are also underway with 554 families who occupy company properties reserved for the implementation of the Cristalino Project, focused on copper and gold extraction in southeastern Pará. During the year, an intervention to remove third-party illegal miners in the project area, who were responsible for the contamination of water resources and causing other environmental damage, was undertaken by the police and coordinated by environmental agencies.

In Minas Gerais, part of the Xukuru-Kariri indigenous group living in areas granted by the federal government in

Brazil for the municipalities of Caldas and Presidente Olegário occupied a Vale property in Brumadinho, called Fazenda Bruma, with approximately 50 indigenous people distributed in 16 families. This is an area acquired by Vale for environmental compensation purposes, where a lagoon has been set aside as a mechanism for protecting exotic fish species. This area requires monitoring and daily maintenance and poses risks if the proper inspections are not performed, especially during the rainy season. The monitoring of this property is carried out by the State Forestry Institute (IEF) and AECOM. Vale also has administrative buildings nearby and construction continues on the Temporary Animal Shelter Center. We intend to use the area for the preservation of an endangered species of Atlantic Forest and to create a protected area under Brazilian legislation (APP).

Also in Brumadinho, indigenous people of the Kamakã Mongoió ethnic group, who originally lived in the Guayra village in Esmeralda, occupied a Vale property called Fazenda Córrego de Areia, also intended for environmental offset. This and the Fazenda Bruma situation remain unresolved and, by December 2022, are subject to legal processes.

## 7. Voluntary investments GRI 2-23

Based on our purpose “to improve life and transform the future. Together”, Vale is committed to embedding sustainability into its business, aiming to contribute to positive economic, social and environmental legacy, in addition to mitigating negative impacts of its operations.

Vale has for decades invested in voluntary initiatives that promote health, education, infrastructure, science, culture, biodiversity conservation and other significant agendas mainly in the areas where it operates.

Read more about social ambition on the [Vale ESG portal](#).

### Fighting poverty

To meet our long-term goal of helping 500,000 people escape extreme poverty by 2030, after a broad consultation and research exercise, we developed a methodology based on the familial unit (instead of individuals), with a special focus on children. We consider poverty as a multidimensional concept, which goes beyond income generation to include other variables that ensure fundamental rights necessary for basic dignity and family subsistence.

Families are at the centre of the proposed approach. An action plan is drawn up, together with each family unit, around the dimensions

of education, income, health and nutrition, and infrastructure. The plan also recognizes the level of deprivation experienced within the context of urban, rural and forest environments. Once the plan is developed, the process for multidimensional family monitoring begins, which guides the family unit to local public policies and social programs, and monitors the program impact on the daily life and collective evolution of the unit.

The Fight Against Poverty Program is intended to be implemented in partnership with governments, civil society institutions and other corporations, aiming for

Vale is committed to embedding sustainability into its business, aiming to contribute to positive economic, social and environmental legacy.

the creation of joint initiatives, the promotion of institutions that already work with their own methodologies and the development of common goals for the strengthening of public policies to fight extreme poverty.

The first pilots of the Program’s concept will be carried out in 2023, starting the Multidimensional Family Monitoring process with around 30,000 people – 5% of the target – in areas where Vale has a significant presence, such as Pará, Maranhão and the Amazon region. These pilots are a fundamental to further advance the Program’s strategic vision and methodology.

### In 2022, the Vale Foundation:

More than **6,800** students reintroduced into education.

Training around **2,900** teachers.

Reaching **2,140** schools.

In the health and social assistance field:

**312** Basic Health Units (UBS)

**60** Social Assistance Reference Centers (CRAS).

Vale Foundation’s work is estimated to have reached around 1.48 million people, including students, educators and health professionals. In 2022, we reached 31% of Brazil’s population in 53 municipalities across six states where Vale operates. In 12 municipalities where the Education and Health Program has begun, that percentage sits at 53%.

Find out more at [www.fundacaovale.org](http://www.fundacaovale.org).





## Vale Foundation

The Vale Foundation is a corporate non-profit organization created in 1968, aiming to strengthen public policies and social development in those areas of Brazil where Vale operates.

The Foundation works with municipal departments, social institutions, and implementing and investing partners for the improvement of public health and education. The strategy requires the presence of hubs in neighboring municipalities for at least the medium-term and intersectoral engagement with public policy, for the development of a common agenda between health, social assistance, and education. The Vale Foundation also maintains five Knowledge Stations, which are equipped to provide educational, cultural and sports activities after school hours.

### Education and Health Program

Through the Vale Foundation, Vale is looking to expand access to the rights to education, health and social assistance, aiming to improve municipal indicators and expand access to those who are in situations of greater social vulnerability and exclusion. In education, the Program focuses on Primary Education, especially in the area of literacy development – a crucial stage in school life – and on work to combat school exclusion, understanding that the right to education is fundamental for the development of resilient communities.

In health, the Foundation focuses on primary care and social assistance, which is considered the “gateway” for most of the population to access broader healthcare systems. Primary care provides disease prevention education, treats injuries and illnesses, and directs more serious cases to higher levels of care. The Foundation is also considering work to strengthen municipal social assistance networks.

Brumadinho's Knowledge Station.



photo: Nilmar Lage

Marabá Knowledge Station (Brasil), Athletics class.



photo: Renato Resende



photo: Isaque Junior



## Vale Fund

Created in 2009, this promotion and investment organization fosters business development, knowledge generation, and financial arrangements focused on the conservation and recovery of critical environmental biomes – with special attention on the Amazon – in Brazil.

By 2022, the amount of USD 11 millions was invested in project and social impact new business. USD 2.7 million through grant-making alongside USD 8.4 million on for-profit investments.

The Fund and its partners supported 139 businesses, benefiting around 9,000 families directly or indirectly in 2022. They are mainly rural producers and resource extractors<sup>1</sup> who live in the Amazon, Cerrado, Atlantic Forest and Caatinga biomes. Recipients work mainly in the value chains of products such as cocoa, coffee, wood, and sustainable meats, among others.

Five of the recipient businesses contribute to Vale's Forest Target 2030, employing more than 360 workers (fixed and temporary) in 45 rural areas in approximately 50 Brazilian municipalities.

Read more in [2030 Forest Goal](#); [Amazon](#) and [Fundo Vale](#).

**Coconut Breakers.** In the photo, representatives of the breakers' communities from the interior of Maranhão.

<sup>1</sup> Resource extraction is an economic practice that consists of removing goods from nature, whether of plant, animal or mineral origin, to be used as raw materials.



photo: Alexandre Rezende



photo: Alexandre Rezende

**Fazenda São Francisco / Belterra Agroflorestal**, in Parauapebas/PA, a project supported by Vale Fund.

## Vale Cultural Institute

Created in 2020 to expand and consolidate Vale's more than two decades of culture-related activities, the Institute's main areas of work are its own museums and cultural centers, music and dance, heritage, and festivities. It brings together four cultural spaces, with free visits and outside activities for all audiences: *Memorial Minas Gerais Vale*, *Museu Vale*, *Centro Cultural Vale Maranhão* and *Casa da Cultura de Canaã dos Carajás*.

In 2022, there were more than 350,000 visits to cultural spaces and instances of participation in the program, which included 65 exhibitions and travelling displays, 427 cultural events and 234 training sessions. More than 32,000 teachers and students participated in events conducted by the four spaces from January to December. Also in 2022, more than 350 projects were selected and sponsored through grants or direct choice and by means of the Federal Law for Cultural Incentives.

*Vale Música*, the Institute's music training program, also stood out in 2022. The initiative includes exchanges between students

and teachers at the training centers, classes with musicians from the professional orchestras sponsored by Vale (Brazilian Symphony Orchestra, Ouro Preto Orchestra, Minas Gerais Philharmonic Orchestra, São Paulo State Symphony Orchestra and Nova Orquestra) and artistic residencies. More than 1,000 children and young people are currently participating in these initiatives.

Learn more at [Vale Cultural Institute](#).

### Ipiranga Museum and National Museum

Through the Vale Cultural Institute, we are part of the reconstruction of two unique cultural and historical heritage sites: the Ipiranga Museum at the University of Sao Paulo which reopened on September 2022, and the National Museum of Brazil which was destroyed by a fire in 2018. In 2022, the Institute – as part of the governance structure of the *Museu Nacional Vive* project – was a partner in restoration work, exhibitions, and educational and cultural initiatives.

## Volunteering

In 2022, the Vale Volunteer Network included more than 6,600 volunteers, who joined forces in at least 500 initiatives involving about 48,000 people from various communities in the regions where Vale operates.

Several campaigns, such as 'Christmas Without Hunger' combined the efforts of volunteers and partner companies in the distribution of around 25,000 food baskets, valued at around USD 213 thousand. The 'Donate Blood, Donate Life' campaign mobilized over 1,000 donors, ultimately benefiting more than 4,000 people.

The Network also promoted reading through the Reading Experiences campaign, working with writers Conceição Evaristo and Cláudia Werneck to raise awareness and train volunteers, and to collaboratively write a practical guide to the creation reading projects.

**More than 450 books were collected** during the campaign and audiobooks of popular stories were recorded by the volunteers.

Read more at [Rede Voluntaria Vale](#).

## Vale Institute of Technology

A private, non-profit science, technology and innovation institution, Vale Institute of Technology (ITV) has been maintained by Vale since 2010 to develop teaching, scientific research, and technological solutions in sustainability and mining. ITV has two courses recognized by CAPES (Coordination for the Improvement of Higher Education Personnel): Professional Masters in Sustainable Use of Natural Resources in Tropical Regions; and Instrumentation, Control and Automation of Mining Processes.

Read more at [ITV](#).



### ITV Sustainable Development (ITV-DS)

#### Belém, Pará

Researches the physical, biological, and socioeconomic environments. It trains young scientists and offers a professional masters course open to society, contributing to more sustainable mining.

### ITV Mining (ITV-MI)

#### Ouro Preto and Santa Luzia, Minas Gerais

Develops solutions used in the mining chain that prioritize energy efficiency, safety and the reduction of CO<sub>2</sub> emissions. Highlights include the development of more controlled methods of ore extraction – which not only give better protection to the communities surrounding our operations, but also ensure greater energy and economic efficiency; and ships equipped with rotating sails and air lubrication technologies (reducing the resistance between a ship's hull and seawater using air bubbles), increasing efficiency and reducing fuel consumption and emissions.

## Genomics for Biodiversity Studies and Monitoring

Genetic studies allow us to better understand species' biology and implement targeted and effective conservation measures to protect them. To that end, ITV researchers have produced genetic references for more than 13,000 plants and animals, with a focus on the Carajás region.

Genetic references are DNA barcodes that can be used to evaluate a species by comparison with a taxonomically validated specimen deposited in a scientific collection. The reference library allows the development of biodiversity monitoring tools using environmental DNA or eDNA. The results of the project have already been used to inform decision-making and in the conservation of endemic and threatened species.

In 2023, in partnership with the Chico Mendes Institute for Biodiversity Conservation (ICMbio), this scientific knowledge was expanded to other protected areas in the Amazon, enhancing management and conservation actions for endangered species and those of special interest to the bioeconomy. The project was launched at the COP 15: Biodiversity Conference held in Montreal, Canada.

Read more in [Nature](#).

## 8. Mine closure and future use GRI 3-3 | GRI G4 MM10

### What do stakeholders expect from Vale?

Information on biodiversity recovery, local economic impacts, land development, and the risk of land invasion and misuse.



The mine of the future has to be intensely linked to land planning, which must incorporate mining and set limits to it. The challenge is to bring the externalities into this planning and to execute it in a participatory manner.”

**Lucas Brasil**, Managing Partner GWS Engenharia, in an interview as part of Vale’s Materiality Review, conducted in November 2022

The process of planning the closure of a mine or other asset involves multidisciplinary teams and must be in place before the beginning of the operation, and Vale must work in partnership with the public authorities

and communities to achieve this. It is important to minimize risks and enhance future opportunities to generate value for the areas populations where the mines are located, especially when it comes to possible future uses of these areas.

That is why 100% Vale’s operations have closure plans that are in line with the best practices adopted by the ICMM and legislation. At the same time, we monitor all mine closure actions and Progressive Rehabilitation initiatives, ensuring that resources are used correctly and that all social, economic, and environmental impacts are considered. In 2022, Vale spent approximately USD 101 million on a range of closure activities and has a provision of USD 3.5 billion<sup>1</sup> to undertake future closure activities.

Another important 2022 result was the dissemination of information on mine closure planning, including the community engagement process.

**For more information, please visit [ESG Portal](#).**

### Igarapé Bahia Mine

Vale invests in strategies to conserve natural environments and rehabilitate mined areas – the Igarapé Bahia mine is a successful example of this work.

Part of the Carajás National Forest, in the municipality of Parauapebas in Pará, the mine was closed in 2002 after 10 years of operation. A new copper project (the ‘Alemão’ Project) is under development at the site and is intended to use some existing infrastructure. However, the rest of the site is undergoing closure and environmental restoration.

Currently around 200 hectares are under rehabilitation, and another 6.72 hectares is considered to be fully recovered, with standing forest – proving that it is possible to reconcile mining with nature conservation.

Most of the seeds used in the area’s restoration were collected from species native to the region, including over 60 tree species. Native orchids and bromeliads have also been reintroduced. With the flora in the process of recovering, the native fauna is also returning to the area.

### Future use strategy

Vale’s future use strategy aims to redefine the use of rehabilitated post-mining spaces, creating opportunities for local employment and the generation of shared value. In 2022, Vale established the Future Use Management department within the VP Sustainability’s portfolio, reaffirming our commitment to this issue. We are prioritizing priority regions for the development of post-mining use in alignment with Vale’s business strategy. It is important that the development of plans for the future use of rehabilitated areas should be done in coordination with wider society and stakeholders in these areas.

Learn more on the [ESG Portal](#).

### Águas Claras Mine Project

Acquired by Vale, the Águas Claras Mine (MAC), in Minas Gerais, belonged to MBR, which operated this asset for almost 30 years. Used as an administrative area since 2008, it is undergoing mine closure and geotechnical stabilization work, as well as studies on the potential for future uses.

In 2022, after the alleviation of Covid-19 restrictions, Vale held two “A Leisure Day at the MAC” events, providing opportunities for the community to get to know the MAC and contribute to the development of the project that is intended to transform the area into a legacy for society.

The MAC is also open for technical visits from universities, public agencies, and institutions to learn about the work we are doing there. In 2022, four technical workshops were held on environmental conservation, cultural heritage and tourism, social and economic development, and urban planning and mobility.

These workshops generated two important documents for future use planning, looking at both the possible opportunities available in the area and how they could be brought to fruition. Further work – including business modelling – is underway to assess the feasibility and likely impact of the proposed projects, which expected to be concluded in 2023.

<sup>1</sup> Every year, we review the estimated cost for decommissioning assets – called Asset Retirement Obligation (ARO) – with disclosure in the accounting reports and meeting the requirements defined by International Accounting Standard (IAS) 37 and Technical Pronouncement CPC 25. The internal controls related to this review of ARO estimates are part of the flows defined by the company to comply with the Sarbanes-Oxley Act.





## 9. Nature

### What do stakeholders expect from Vale?

During the process of reviewing our materiality, we also understood that our stakeholders would like to see information on:

Impacts from mining, with a focus on the Amazon, and on conservation and restoration actions; Measures aimed at minimizing impacts, such as water and atmospheric impacts; Mitigation and adaptation measures in relation to climate change, alignment and evolution of the company's goals with those of the Paris Agreement and Financial impacts related to these processes.



As Vale is a business that has a high impact on nature and many of its operations are located in areas of high biodiversity, it has additional responsibilities as well as opportunities for conservation.”

**Stephen Edwards**, Senior Program Manager, IUCN Center for Economy and Finance, in an interview as part of Vale's Materiality Review, conducted in November 2022.

Nature provides and maintains essential services for the continuity of our operations, such as water supply and climate regulation. Vale is always looking for the best methods, technologies and actions that allow

less interference in natural resources. Nevertheless, we are aware that our operations have both direct and indirect impacts on biodiversity, water, climate and people.

As part of a collaborative process involving more than 90 stakeholders (including employees, NGOs, experts, academics, researchers and sector institutions), we are working to achieve our ambition of being a global benchmark in practices with the goal of minimizing negative impacts and leveraging positive results for nature and people. We want our performance not to be restricted to our actions, but to be able to leverage results beyond our borders and to have positive impacts on society as a whole.

Canaã dos Carajás, Pará, (PA), Brazil. Jabuti in the Gonzaguinha Forest.

### Biodiversity GRI 3-3

Our global operations occupy a total area of approximately 88,000 hectares, about 85% of which is in Brazil and Indonesia, in tropical forests of high biodiversity value (GRI MM1). Given the location of mining reserves and rights, and the rigidity with which these are either enforced or situated, our operation in these areas is restricted, and requires a robust management process.

We map and evaluate our impacts on these areas to help support the prioritization of our biodiversity work, focusing on impact and

risk management, as well as on opportunity mapping.

Our main impacts are related to changes in land use and vegetation cover with the direct consequence of localized loss of flora and the reduction or alteration of fauna habitats. [GRI 304-2](#)

The following table shows our interface with and proximity to areas of high biodiversity value.

More information can be found at [ESG Portal](#).

### Units/operations located in or adjacent<sup>1</sup> to areas of high biodiversity value GRI 304-1 | 304-3

2022	Hectares
<b>Total impacted area</b>	<b>87,731</b>
In the wilderness	43,487
In hotspots	35,699
In protected areas <sup>2</sup>	30,054
Adjacent to protected areas	39,722
Priorities for conservation outside protected areas	9,623
Adjacent to conservation priorities outside protected areas	9,595

<sup>1</sup> Adjacent are considered those protected areas located within a 10 km buffer from the operations.  
<sup>2</sup> It is important to highlight that the areas impacted in Protected Areas refer to conservation units of sustainable use, whose creation decrees allow our activities.

In 2022, 4,175 species were recorded in habitats impacted by Vale's operations or located near these operations. Of these, 78 are considered threatened according to the IUCN categories: Critically Endangered (5), Endangered (20), and Vulnerable (53). [GRI 304-4](#)

Operations that generate significant impacts in areas of high value for biodiversity require Biodiversity Management Plans, whether based on legal obligations or voluntary commitments. Of all our operational units assessed in 2022, 47 (88.7%) required the preparation of biodiversity management plans ([GRI G4 MM2](#)). Of these, 80.9% already have Management Plans in place, and the rest have plans under implementation or planned.

In the last two years we have also reported on biodiversity-related impacts, risks and opportunities for operations which are considered to be a priority as a result of their location and interface with nature, as well as our management strategies, under the [CDP Forests – Minerals and Metals](#)<sup>1</sup>.

We believe scientific research and innovation are essential in developing more effective methods to manage our impacts, reclaim post-mining areas, restore habitats, and conserve or maintain habitats and species. [Find out more at Vale Institute of Technology.](#)

The restoration of mining-impacted areas covers all phases of an operations' life cycle, from prospecting to closure. Since some project impacts often cannot be avoided, the post-mining rehabilitation process is among the most important measures to restore and compensate these impacts. [Read more in the Databook.](#)

We protect in our own areas and in partnership with third parties, in voluntary actions and in compliance with the legislation, around 965,000 hectares<sup>2</sup> of natural environments in areas of high biodiversity value ([GRI 304-3](#)). This means that for every hectare altered or impacted by our operations, we protect 11 hectares.

In addition, Vale has been studying new protection strategies as part of initiatives aimed at achieving our Forestry Goal 2030, focusing on learning

and innovation. In 2022 a REDD+ project became part of this set, contributing to the protection of about 50,000 more hectares. [Read more in Forestry Goal.](#)

In the Amazon, in the region of Carajás, we have been working in partnership with ICMBio for more than 30 years, supporting the conservation of approximately 800,000 hectares. In the Atlantic Forest, we support the conservation of approximately 180,000 hectares, in our own areas and through partnerships. This total includes the Vale Natural Reserve (RNV), which is a Vale property set aside for conservation and research, as well as the Sooretama Biological Reserve, which is a protected area managed by ICMBio. Together they form the largest remaining block of the Atlantic Forest of Espírito Santo, protecting around 50,000 hectares and harboring endangered and endemic species.



For every hectare altered/impacted by our operations, we protect

**11 hectares**

## Commitments

### GRI 2-23

Vale is committed to preventing and neutralizing significant impacts from new projects and expansions in areas of high biodiversity value, aiming for no net loss and, whenever possible, generating positive impacts.

Vale adheres to the ICMM's Mining Principles, including Principle 7 and its performance expectations focused on the conservation of biodiversity, and to the Brazilian Business Commitment to Biodiversity of the [Brazilian Business Council for Sustainable Development \(CEBDS\)](#).

In 2021 we announced our decision not to operate in UNESCO<sup>3</sup> Natural World Heritage Sites. This commitment is part of our internal Biodiversity Management Guidelines and Processes. It is important to highlight that we do not have projects or operations in

these areas, and we help to protect an important site – the Discovery Coast Atlantic Forest Reserve – which comprises the Vale Natural Reserve (RNV) and the Sooretama Biological Reserve (ReBio Sooretama).

### 2030 Forestry goal

By 2030, Vale will reclaim and protect 500,000 hectares outside our fence lines, ensuring positive outcomes for nature, people and our climate change strategy. The target is broken down into two objectives. The first is to recover 100,000 hectares through the development and support of businesses

## Taskforce on Nature-related Financial Disclosures

The Taskforce on Nature-related Financial Disclosures (TNFD) is a framework that aims to develop nature-related risk disclosure guidelines to provide transparency to global financial flows related to the loss or regeneration of nature.

In 2022, Vale took part in public consultations by the TNFD, joined its discussion forum, committed ourselves to piloting the applicability of the TNFD's guidelines, with sectorial alignment coordinated by the ICMM, and joined the Brazilian consultative group coordinated by CEBDS. Results so far indicate that we have partially met the guidelines, and that more work will be needed in 2023 for Vale to develop further in this regard.

with social and environmental impact, making room for developing partnerships, testing new models, and business scalability. The second is to protect 400,000 hectares through partnerships to support public protected areas and initiatives such as REDD+ projects.

[Read more in Progress on long-term commitments.](#)

Through the Vale Fund, we undertook several initiatives that contributed to the forestry target in 2022. Highlights include the Acceleration Program, in partnership with CERTI Foundation, Darwin Startups,

and Palladium, which focused on strengthening the five businesses in the 100,000 hectares recovery portfolio.



Learn about the five businesses through the [Aupacast podcast](#).

[Read more in Vale Fund and the Relatório de Impacto.](#)

<sup>1</sup> CDP is a non-profit organization that operates the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.  
<sup>2</sup> Protected areas are considered here according to the IUCN definition (Guidelines for Applying Protected Area Management Categories, 2008): "clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values. This area does not include Legal Reserves and Permanent Preservation Areas (APPs), specific categories of legally protected areas that make up the Brazilian Forest Code.  
<sup>3</sup> United Nations Educational, Scientific and Cultural Organization (UNESCO).



Vale's forestry goal serves to foster the development of an ecosystem of agroforestry businesses and forest restoration and protection that will, in addition to protecting and restoring 500,000 hectares, stimulate and accelerate the creation of a set of new businesses that will drive a restoration journey to contribute to Brazil's climate goals and to the promotion of a new sustainable and inclusive rural development model."

**Valmir Ortega**, founder and CEO of Belterra Agroflorestas, a social and environmental impact business developed as an outcome of Vale's forestry goal, which seeks partnerships with small and medium farmers to create productive forests in degraded areas, improving the lives of family farmers, rehabilitating areas and promoting the implementation of agroforestry systems.



**Listen here** to the podcast in which Belterra's CEO explains how the model works, the potential of this market in Brazil, and the challenges for large-scale implementation.

## Biomes

During the COP27 Climate Change conference, Itaú Unibanco, Marfrig, Santander, Suzano, Rabobank and Vale announced the creation of a new company – Biomás. The goal is to restore and protect an area of 4 million hectares of native forests (equivalent to the territory of Switzerland or the state of Rio de Janeiro) in biomes such as the Amazon, Atlantic Forest, and Cerrado over 20 years. This work should result in the removal or prevention of around 900 million tons of carbon equivalent emissions over two decades.

Read more at <https://www.wearebiomas.com/>

## Amazon

About 60% of Vale's production comes from the Amazon. In this biome, in partnership with ICMBio, we support the conservation of almost 800,000 hectares in the Carajás Mosaic of Conservation Units, where our operations occupy about 2% of the total area (only in units where our activity is permitted). In addition, we oversee projects that protect ecosystems, provide education, create partnerships for local development, and strengthen sustainable businesses. This is in addition to the solid support and production of scientific research through the ITV. This work accounted for an approximate contribution of USD 500 million in voluntary socioenvironmental investments between 2019 and 2021 alone.

Vale understands that it can and should do more for the sustainability of the biome. That is why, in 2022, we conducted a broad consultation with a range of stakeholders and specialists in the region to understand the current challenges, and opportunities. The company designed a strategy to expand our voluntary action fronts and has started some initiatives, with co-financing and execution partners, in a broad coalition of efforts to leverage positive results.

### Startup platform to boost the Amazon bioeconomy

In partnership with Bradesco, Itaú Unibanco and Santander Brasil, the Vale Fund has announced investments in the *Jornada Amazônia* platform, which aims to stimulate innovative companies in forest-related production chains. The project will train people in entrepreneurship for bioeconomy-related businesses in the Amazon, improve operating conditions, and provide support to strategic organizations that foster startups. The goal is to train up to 3,000 people and create 200 startups over the next three years. The first public tenders should be launched in 2023.

### Networks in the Amazon

Vale has been helping strengthen civil society networks and coalitions related to the Amazon, such as the creation of Latimacto's Panamazonian Agenda, via the Vale Fund, which aims to bring together Latin American institutions that finance impact businesses for the conservation of the biome. We also participated in the [Working Group for the Amazon Concertation](#), in the [Brazil Coalition on Climate, Forests and Agriculture](#) and in the Amazon Working Group of the [Brazilian Business Council for Sustainable Development \(CEBDS\)](#).



photo: Ricardo Teles

BioPark Vale Amazônia, Parauapebas (PA), Brazil.

### Garante Amazônia and Juntos pela Saúde

At COP 27, Vale and the Brazilian Development Bank (BNDES) announced the signing of two protocols of intent focused on the North and Northeast regions of the country: the *Garante Amazônia* (Amazon Bioeconomy Loan Guarantee Program) and the *Juntos pela Saúde* (Together for Health) initiative. The two companies will invest USD 20.9 million in the

protocols, which focus on the promotion of primary healthcare and the stimulation of sustainable economies in these regions. Vale is the first partner to join the actions and will contribute USD 3.9 million to *Garante Amazônia* and USD 6.6 million to *Juntos pela Saúde*, with a matching amount from the bank. The announcement took place during an event at the UN Conference on Climate Change, COP 27, in Sharm El Sheikh, Egypt.

## Ecoefficiency GRI 3-3

### What do stakeholders expect from Vale?

Measures that minimize impacts, such as water availability and air pollution.



There is a set of actions from the inside out and from the outside in, and I recognize that Vale does both. Within its perimeter, loss control, efficient use, consumption reduction, and water recirculation. And, from the inside out, Vale's concern reaches beyond its perimeter, to the watershed and to its neighbors, because it doesn't make sense for Vale to have water for its operation and have a community next to it without water.

One role that Vale is already playing is to get closer to the populations that are in the vicinity of its operations and work in partnership with the government so that there is no shortage of water. Even if this responsibility does not lie with the company, what it can do in the sense of collaborating in preservation, in controlling springs, in purification and treating erosion, is a very important path.

Access to water is not a fight of good against evil, what we have to have are partnerships. What we want in Brazil are pacts for good water use, efficiency, and cooperation. This is being built day by day, because Brazil is very diverse and unequal, and you have to capture this in the solutions."

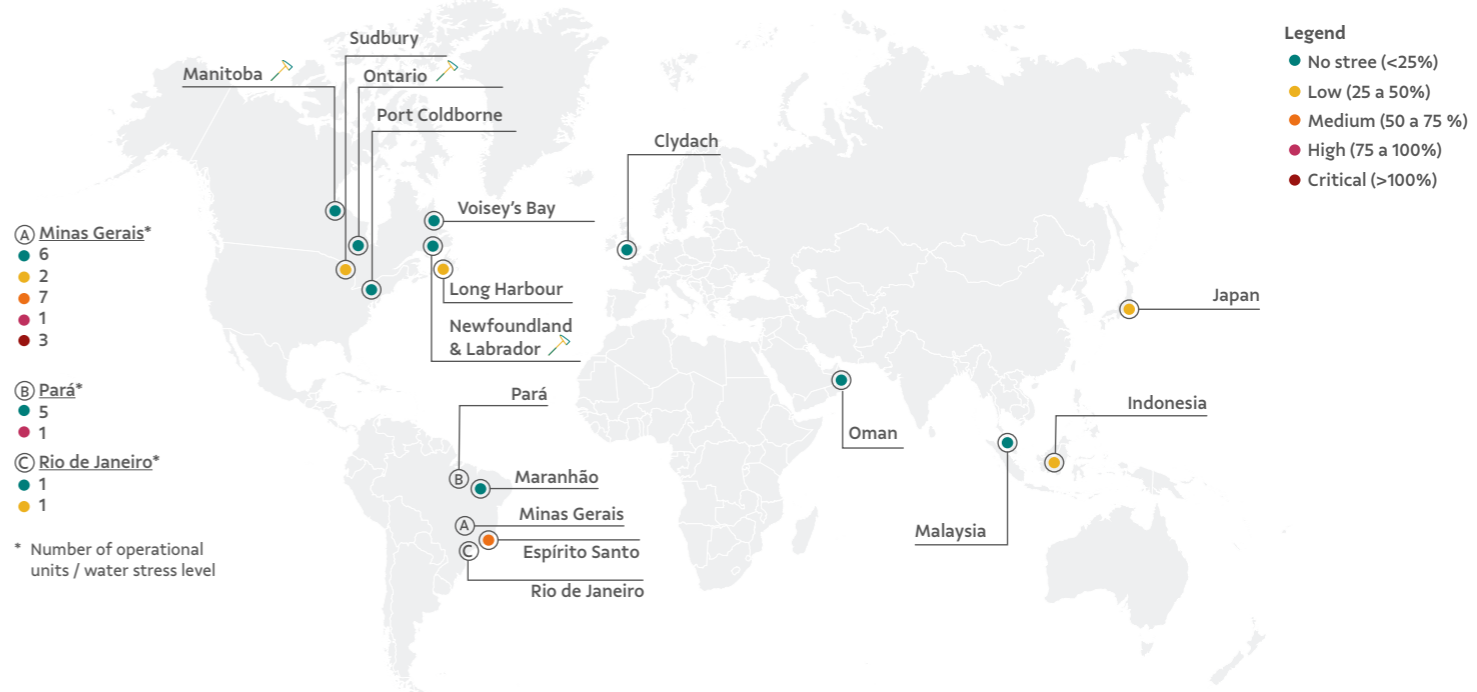
**Valmir Pedrosa**, professor at the Federal University of Alagoas and consultant for the National Water and Basic Sanitation Agency (ANA), in an interview as part of Vale's Materiality Review, conducted in November 2022.

## Water resources GRI 303-1 | 303-2

Our activities depend on water resources. This means we have an important role to play in the quest for responsible water use. We understand that Vale must also contribute to the shared management of these resources with other users in the watersheds where we operate.

In 2021, Vale achieved its New Water specific use reduction target (10% reduction), launched in 2018. We will release the new target in 2023, with a horizon of 2030. The new goal will broaden the scope beyond specific internal uses and consider local aspects related to availability, quality, access to water, and the ecological health of the watersheds where we operate. For this, we adopted Indicator 6.4.2 of the United Nations 2030 Agenda as a base point. This indicator shows whether water stress exists in the analyzed watershed. It is calculated<sup>1</sup> from the ratio between the total freshwater withdrawn in the watershed and the total water resources available for use.

### Level of water stress in the watersheds where we operate



Vale analyzed our entire area of influence – into the sub-basins where we operate. The outcomes of this analysis were then used to implement specific regional operations.

Read more in the [Databook](#).

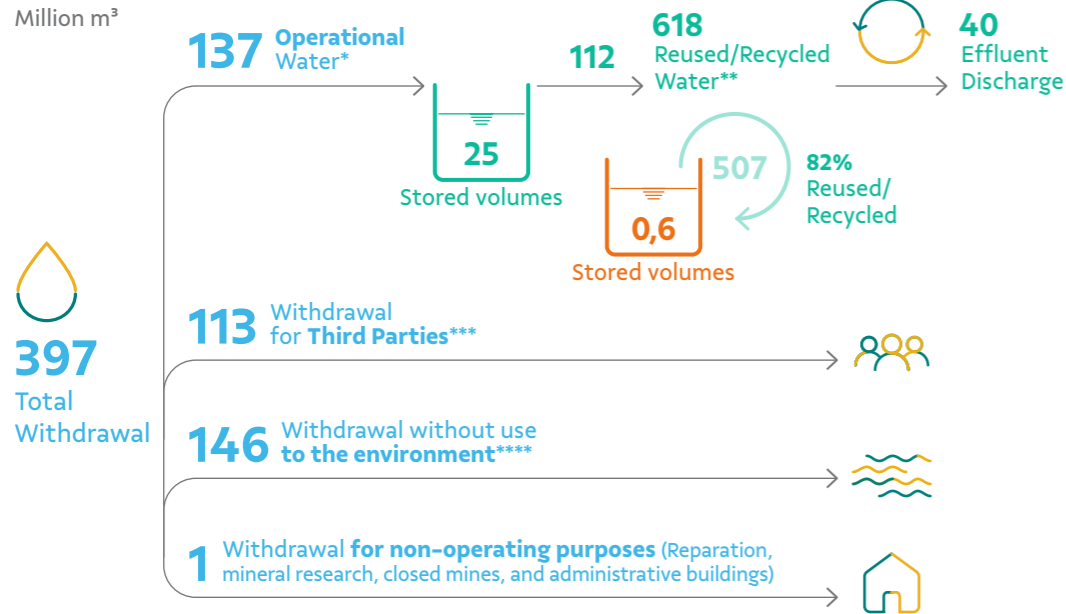
### Our water management model is based on four pillars:

- **Governance:** Processes and responsibilities.
- **Monitoring and Control:** Strategic water quality monitoring network units in water-stressed regions with the greatest contribution to reducing specific use.
- **Community Engagement:** Support to priority communities for water improvement in the watersheds where we operate.
- **Water Risk Management:** Water risks mapped and managed.

Significant progress has been made in the integration and automation of monitoring systems, facilitating the monitoring of water resource and effluent management through iterative dashboards, in addition to continuous improvement of field instrumentation, with the installation of more than 600 new flow meters.

<sup>1</sup> Defined by the formula  $EH = \frac{TFWW}{(TRWR - EFR)}$ , where: EH = Water stress level, given in %; TFWW = Total freshwater abstracted; TRWR = Total renewable freshwater resources, including surface water EFR = Environmental flows (water needed for aquatic life), in m<sup>3</sup>/s.

**Water Balance** GRI 303-3 | 303-4 | 303-5



\* Operational water refers to water captured for production purposes.  
 \*\* As of 2022, to calculate reuse, the stored volumes were subtracted from the volume of water withdrawn and volume of water reused. You can see in detail the formula used for the calculation in the basis of preparation. There was no recalculation for the 2021 values.  
 \*\*\* Water collected and made available to third parties refers to water collected for the purpose of supplying third parties, such as local communities near Vale operations.  
 \*\*\*\* Water withdrawn without use and returned to the environment is water withdrawn that has not entered the production process and has not been used in any other way and has been returned to the environment.



photo: Anderson Souza

**CDP Water Results**

In 2022, for the second year in a row, we received a B rating in the CDP Water Safety assessment, which represents a score above the mining sector average.

**Mitigation of impacts related to water resources**

The ITV conducts research to improve planning for water risks in the basins where the company operates. We evaluate how landscape changes and climate changes can impact the availability of water resources and identify how these water risks impact watersheds and the communities within them. Some examples of these research results are:

- Estimates of flow (maximums and water availability) and water production (evapotranspiration) in the Itacaiúnas river basin and the basins along the Carajás Railroad, using hydrological modeling and remote sensing techniques;
- Calculation of extreme precipitation indices in the Mearim river basin;
- Developing a database for intensity, duration and frequency of heavy rains in the Itacaiúnas river basin;
- Environmental quality assessment of headwater basins and springs in the Itacaiúnas river basin; and
- Mapping areas susceptible to flooding around the cities of Parauapebas, Marabá and Eldorado dos Carajás.

Read more in [Climate-related risks and opportunities](#) and [Vale Institute of Technology](#).



photo: Leo Lopes

**Atmospheric emissions** GRI 3-3

The atmospheric emissions from our operations consist mostly of particulate matter (PM), sulfur oxides (SOx) and nitrogen oxides (NOx), which influence the air quality in surrounding regions. Our main emission sources are Pelletizing and Base Metals plants and the use of fuel in equipment and vehicles.

In 2021, we set our global emissions reduction targets, to be reached by 2030. They include:

**Reduction of emissions:**

- 16%** in Particulate Matter emissions
- 16%** in Sulfur Oxide emissions
- 10%** of Nitrogen Oxide emissions

Read more in [Progress on long-term commitments](#).

These emissions are managed through a number of tools, atmospheric dispersion studies, and continuous monitoring, which guide us in the continuous improvement of our operational controls – ultimately aiming to eliminate, or when not possible, to mitigate environmental impacts.

As an example of our continuous monitoring, we have Environmental Control Centers (CCAs) at our main operations, which operate 24 hours a day, collecting data that allow us to extract the maximum efficiency from our installed controls. Inputs include environmental monitoring, and operational and neighboring community information.

### Particulate Matter Emissions GRI 305-7

(In KTON)

	2019	2020	2021	2022
Nickel	6.6	7.3	3.3	2.6
Pelletizing	2.1	1.6	1.4	1.6
Manganese	0.4	0.1	0.1	-
<b>Total</b>	<b>9.1</b>	<b>9.0</b>	<b>4.8</b>	<b>4.2</b>

### SOx emissions GRI 305-7

(In KTON)

	2019	2020	2021	2022
Nickel	71.0	90.2	66.1	66.5
Pelletizing	11.4	7.5	8.2*	7.1
Logistics	2.3	0.5	2.0	1.9
Other businesses	1.5	0.9	1.2	0.2
<b>Total</b>	<b>86.2</b>	<b>99.1</b>	<b>77.5</b>	<b>75.7</b>

### NOx emissions GRI 305-7

(In KTON)

	2019	2020	2021	2022
Nickel	12.2**	15.2	8.0**	5.7
Pelletizing	11.5	14.1	18.1***	19.8
Iron ore	1.6	0.5	3.0	2.8
Logistics	11.8	16.5	18.3	15.6
Other businesses	3.2	0.9	1.4	0.8
<b>Total</b>	<b>40.3</b>	<b>47.2</b>	<b>48.8</b>	<b>44.7</b>

Note: The reduction in particulate matter emissions observed in the nickel business is due to reduced production at PTVI in 2022 in conjunction with operational improvements.

### Tubarão Unit

Particulate material emissions from the chimneys of the Tubarão Unit currently account for around 14% of Vale's total. In addition, there are other sources of diffuse emissions in material handling operations. Aiming to reduce the impacts of atmospheric emissions, CVRD has been making major environmental investments every year, through the Tubarão Environmental Master Plan (PDA). The PDA includes all the actions to control atmospheric emissions established in the Environmental Commitment Term that Vale signed with the public authorities in 2018.

We are making progress in minimizing the impacts of atmospheric emissions from our local operations. Of the 131 planned projects, 41% are concluded, 44% are in the implementation phase and 6% are in the contracting phase, totaling about 91% of the total. Highlights for 2022 include the enclosure of 32 belt transfer houses, the closing of the coal loading silo, the deployment of 10 new wheel washers, the adaptation of 234 belt chutes, and the start of work on new Wind Fence<sup>1</sup>.

## Environmental management

To address the risks of the production process, minimize the social and environmental impacts of our operations, and respond to the various demands of our stakeholders, we base our strategy and environmental management approach on the VPS. We also take into account international best practices, standards and benchmarks, such as ISO 14001:2015<sup>2</sup>. Both the Health, Safety and Operational Risks and the environmental disciplines at Vale are structured on the concept of lines of defense for risk management.

In this approach, the first line of defense is the operational area itself, the second line is the corporate area of Environmental Management, and the third line is the Internal Audit function. In line with this approach, we continue to invest in new technologies, undertake research, and structure our actions to efficiently manage our risks. In 2022, we initiated a series of studies with our main operational units to discuss the production process in depth, seeking

greater operational efficiency, and consequently less environmental impact at the "end of the pipeline". Based on these studies, agreements on operational indicators were reached, between the operational units and the local environmental discipline, and which are monitored on a monthly basis.

More generally, recent environmental advances include:

- several decarbonization initiatives at our operations and in the production chain;
- operational improvements that reduce the impacts of atmospheric emissions on water bodies, and from noise and vibrations;
- actions for biodiversity conservation and rehabilitation of degraded areas, both within and outside the company's boundaries.

Vale also seeks to strictly comply with the multidisciplinary social and environmental programs and plans arising from the environmental licenses for our operations.

Despite all our efforts to improve environmental management and controls, Vale still experienced environmental incidents in 2022. When these incidents occur, we apply global premises of incident management:

- **initial communication** (internal and external),

- **adoption of immediate and control actions**,
- **root cause investigation**, implementation of corrective actions,
- **scope analysis**, and
- **the recording of lessons learned** with the aim of avoiding recurrence, whether at the same location or at any other operational unit.

### Total environmental incidents<sup>3</sup>

	2020	2021	2022
<b>Total incidents</b>	24	33	24
<b>Severity critical and very critical incidents</b>	3	0	0

### Serious incidents and environmental impacts by country in 2022

Country	Incidents	Environmental Impacts
<b>Brazil</b>	19	Change in the quality of water, soil, air and reduction of biodiversity
<b>Canada</b>	3	Change in water and air quality
<b>Indonesia</b>	2	Change in water and soil quality

- 1 Wind Fences or wind barriers are metallic structures with screens installed around the product storage yards with the objective of reducing wind speed and, consequently, minimize wind drag.
- 2 75% of our operations are ISO 14001:2015 certified and we are committed to certify 100% of our operations by the end of 2024.
- 3 Environmental incidents: unplanned event that resulted in an adverse environmental impact. Environmental impact: Any change in the physical, chemical and biological properties of the environment, caused by any form of matter or energy resulting from human activities that, directly or indirectly, affect the health and safety of the population, social and economic activities, biota and/or the aesthetic and sanitary conditions of the environment.

\* In 2021 a SOx emission relative to the pelletizing business of 7.8 kt was disclosed; in 2022 an adjustment was made relative to the Vargem Grande pelletizing unit due to data control refinement. GRI 2-4

\*\* The NOx values for the Nickel business changed in 2019 and 2021 due to adjustments in the consolidation when revisiting the data for Onça Puma, PTVI and Sudbury. GRI 2-4

\*\*\* In 2021 a NOx emission relative to the pelletizing business of 17.0 kt was disclosed, in 2022 an adjustment was made referring to the Vargem Grande pelletizing unit due to data control refinement. GRI 2-4

# 10.Climate GRI 3-3 | 201-2

## What do stakeholders expect from Vale?

Mitigation and adaptation measures in relation to climate change, alignment of targets with those of the Paris Agreement, transparency in the annual evolution of intermediate targets, in the trajectory of emissions, and in the demonstration of the capacity to deliver on the commitments made. In addition, they want information about the financial impacts of this work.

Climate change, as has been pointed out in the [World Economic Forum's Global Risks Report](#) for almost a decade, is among the top global risks for society and global supply chains. This is also reflected in Vale's stakeholder concerns and material issues. In this sense, it is our priority to promote low-carbon mining, which contributes to the entire value chain, making our business resilient to the effects of climate change and allowing us to contribute to the just transition.

To accelerate the decarbonization agenda, Vale, supported by our global policy on climate change, Vale has a robust low-carbon governance, maintaining, since 2019, a held regular discussion forum consisting of members of our executive committee and senior leadership; and we link emissions reduction targets to the variable compensation of our senior management team.

Read more in [Leadership Compensation](#).

**Board of Directors and Sustainability Committee:** responsible for strategy oversight and support.

**Low Carbon Forum:** Monthly meeting, with quarterly participation of C-Level leaders, focused on monitoring the delivery of our climate agenda deliverables.

In 2017, Vale aligned with the Task Force on Climate-Related Financial Disclosures (TCFD) guidelines to understand, assess, govern and report on the impacts of the transition to a low-carbon economy and the physical impacts of climate change on our operations, and we continue to participate in existing major assessments. In 2022, we received an A-rating in the CDP Climate Change<sup>1</sup> assessment for the third year in a row, an above average



The key word for the private sector is transition. We can no longer produce, consume, and pollute as before, since this model has led to the depletion of a wide variety of planetary limits. From a climate perspective, we need to achieve dramatic emissions reductions by 2030 and this can only be achieved if companies direct concrete efforts from now on in reallocating financial, material, and human resources in a just transition to an economy that works for people and the planet.”

**Fernanda Coletti**, Corporate Engagement Manager – CDP Latin America

score for the mining sector. The CDP has updated its scoring methodology and added new questions to the document, which has made the assessment more rigorous as compared to previous years.

We publish Vale's climate change strategy and our updated progress, including the decarbonization roadmap, annually. **In addition to the CDP, information can be found in the [Report Databook](#), [ESG Portal](#), and the [Climate Change Report](#).**

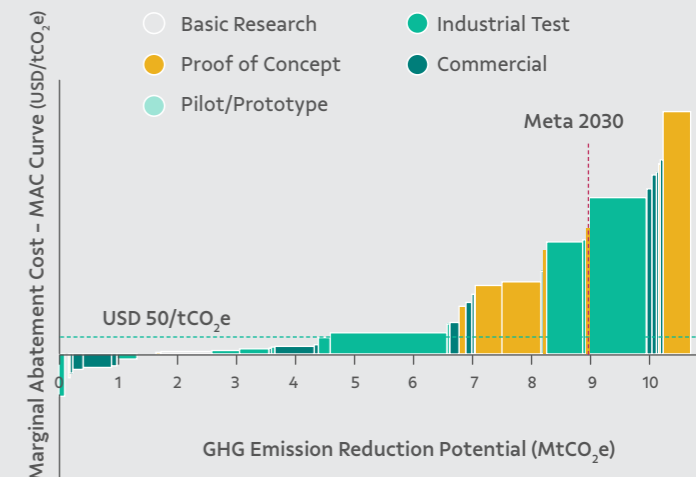
### GHG Emissions Reduction potential by project type

Biodiesel and efficiency	6%
Scope 2	18%
Bioenergy	56%
Electrification	7%
Natural Gas and other <sup>2</sup>	13%
Total Reduction Potential	100%

The chart above shows the total emission reduction potential in 2030, according to the initiatives accounted for in the 2022 MAC curve.

## Strategies that support integrated climate management

To manage the risks and opportunities issues related to our decarbonization initiatives, Vale has built a plan, with clear milestones, to meet our greenhouse gas (GHG) reduction goals. Our current portfolio of initiatives comprises more than 40 projects, prioritizing the most cost-competitive ones in an effort to meet the 2030 target, based on a Marginal Abatement Cost (MAC) curve. All investment decisions are evaluated against a scenario of a USD 50 per ton of CO<sub>2</sub> equivalent<sup>3</sup>. This practice not only encourages investments in the reduction of GHG emissions, but also prepares Vale for a scenario of more restrictive regulations.



1 A non-governmental organization that assesses the strategy and practices of organizations on issues such as climate change, water resources, and forests.  
 2 Projects that do not fit into the previous categories, such as process change and additive use.  
 3 Established in accordance with the Carbon Pricing Leadership Coalition (CPLC).

### Carbon targets

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

**Achieve net zero**  
Scope 1 and 2 emissions by 2050

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

**Reduce 15%**  
Scope 3 net emissions by 2035

Based on the continuous evaluation and maturity of the MAC Curve, we have developed our GHG emissions reduction path, weighing the costs, risks, and opportunities according to the deadlines of our commitments.

## Roadmap for reductions in Scope 1 and 2 GHG emissions<sup>1</sup>

Our goal of a 33% reduction of Scopes 1 and 2 emissions by 2030 is intended to be aligned with the Paris Agreement goal of limiting global warming to less than 2°C and is based on 2017 emissions, which totaled 12.2 MtCO<sub>2</sub>e. The target was established according to a science-based methodology<sup>2</sup> and we aim not to use carbon credits to achieve the commitment.

Our decarbonization roadmap includes renewable energy initiatives that would allow us to meet 100% of Vale’s electricity consumption from renewable

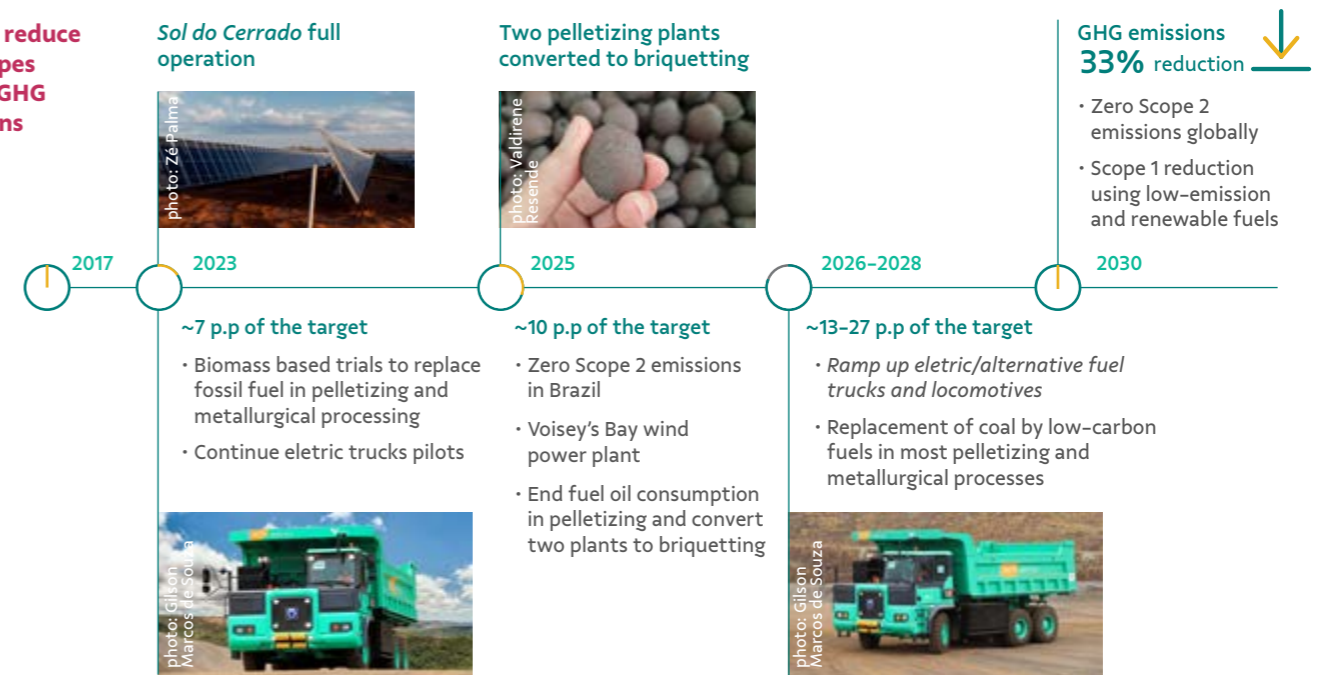
sources, which is reflected in our goals of reducing our Scope 2 emissions to zero in Brazil by 2025 and in other countries by 2030. In this sense, having reached almost 100% renewable electricity consumption in Brazil by 2022 is a relevant intermediate milestone in relation to our decarbonization commitments.

In the medium and long term, we will aim to reduce GHG emissions at our operations seeking to increase the energy efficiency of processes and develop solutions for the replacement of fossil energy sources by

renewable alternatives. These may include the use of electricity and alternative fuels in trucks and locomotives, as well as the replacement of coal and other fossil fuels by renewable or low-carbon fuels in pelletizing and in our metallurgical processing. As part of this strategy, in 2022 we continued pilots for the use of biocarbon<sup>3</sup> and bio-oil<sup>4</sup> for pellet production and 72-ton electric trucks in mines, among other initiatives.

See the Scope 3 emissions results in [Reduction of carbon in the value chain](#).

### Path to reduce our Scopes 1 and 2 GHG emissions



As we strive to achieve our goals for reducing greenhouse gas emissions, we expect to invest between USD 4 and USD 6 billion in our operations by 2030. Since 2020, our expenditures on climate change have totaled USD 810 million, of which USD 543 million in this last year.

See more about our projects at [ESG Portal](#).

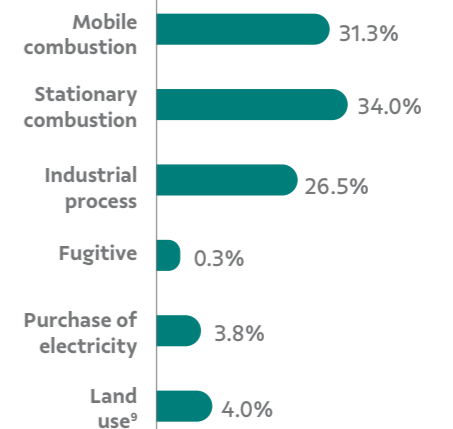
### Scopes 1 and 2 GHG emissions<sup>5</sup> GRI 305-1 | 305-2 | 305-5 (In millions of tons of CO<sub>2</sub>e)

Emissions/year	2017 baseline	2020	2021	2022
Scope 1	10.9	8.4	8.7	8.6
Scope 2 (market based) <sup>6</sup>	1.3	0.4	0.3	0.3
<b>Total</b>	<b>12.2<sup>7</sup></b>	<b>8.8</b>	<b>9.0</b>	<b>8.9</b>

In 2022, our direct emissions including fuels, industrial processes and other minor sources (Scope 1) and indirect market-based emissions regarding electricity purchase (Scope 2) totaled 8.9 MtCO<sub>2</sub>e, a reduction of 27% when compared to 2017 baseline<sup>8</sup>. This reduction is mainly due to the decrease in production volumes compared to 2017.

### GHG emissions by source in 2022

An increase in production is expected in the short term, according to Vale’s production and sales report, which may lead to an increase in emissions, given the current correlation between production volume and emissions. In the medium term, a drop in emissions is expected, in line with decarbonization efforts, which is related to the implementation of low carbon initiatives by the PowerShift program.



<sup>1</sup> The roadmap for decarbonization and the projection of emission reductions for Scopes 1 and 2 considers the contribution of each of the projects on the MAC curve and associated costs.  
<sup>2</sup> Calculation methodology: SBTi – TWG-INF-002 | Version 4.2 April 2021.  
<sup>3</sup> Biocarbon is a renewable, currently considered carbon neutral by the GHG Protocol, product obtained by carbonizing certified biomass, being tested to replace coal.  
<sup>4</sup> Bio-oil is a renewable, currently considered carbon neutral by the GHG Protocol, product based on vegetable oil, being tested to replace natural gas.  
<sup>5</sup> Vale’s 2022 GHG inventory results were audited by a third party.  
<sup>6</sup> Vale’s Scope 2 location-based emissions totaled 0.6 million tons of CO<sub>2</sub>e, a 52% reduction compared to 2017.

<sup>7</sup> Base year 2017 Scope 1 and 2 emissions reduced from 13.5 million tons of CO<sub>2</sub>e to 12.2 million CO<sub>2</sub>e due to investments in coal and ferroalloys assets, manganese operations (except Simões Filho plant), Centro-Oeste System and Vale Nickel (Dalian) Co., carried out in 2022. GRI 2-4  
<sup>8</sup> Results are reported in absolute emissions and do not include any compensation.  
<sup>9</sup> The calculation of land use emissions and removals (LULUCF) does not include soil carbon. In addition, emissions are restricted to suppressed areas owned by Vale and ADA (Area directly affected by Vale). We have been following the trends of the theme (GHG Protocol) and addressing future accounting improvements.



**Emission intensity**

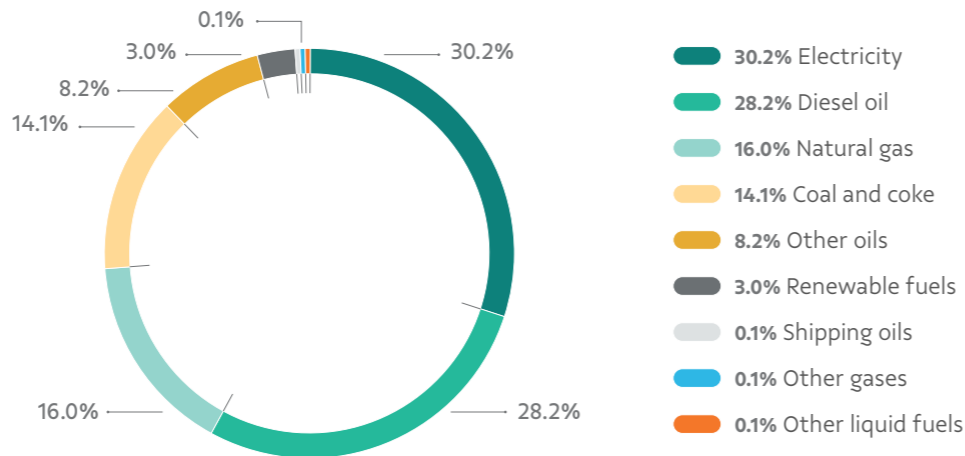
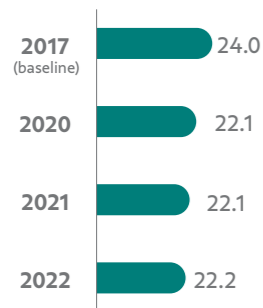
Vale's emission intensity indicator in 2022, of 22.2 kg CO<sub>2</sub>e/t MFe-eq<sup>3</sup>, was 7% lower than 2017 intensity of 24.0 kg CO<sub>2</sub>e/t MFe-eq<sup>2</sup>. This improvement is mainly due to the consumption of electricity purchased in Brazil, backed by 100% renewable energy certificates, which reduces our Scope 2 emissions. GRI 305-4

**Energy consumption matrix by source**  
GRI 302-1 | 302-3 | 302-4

Energy consumption in 2022 was 137,000 TJ, a slight reduction compared to the previous year, due to a lower recorded consumption of Diesel and electricity, both in Mozambique and in Brazil, given the sale of the assets of coal and ferroalloys, in addition to manganese operations in Minas

Gerais and ferrous assets in the midwest system. This reduction was only not more significant due to the maintenance of consumption levels for the production of iron ore and pellets, in addition to the better performance in the production of Nickel at Onça Puma. GRI 302-1

**Emission intensity**  
GRI 305-4  
(kg CO<sub>2</sub>e/t MFe-eq)<sup>1</sup>



<sup>1</sup> 75 The production volumes of Vale's main products, such as pellets, coal, nickel and copper, are converted to tons of iron ore equivalent.  
<sup>2</sup> Base year 2017 emissions intensity reduced from 25.6 kg CO<sub>2</sub>e/t MFe-eq to 24.0kg CO<sub>2</sub>e/t MFe-eq due to divestments in coal and ferroalloys assets, manganese operations (except Simões Filho plant), Centro-Oeste System and Vale Nickel (Dalian) Co., carried out in 2022. GRI 2-4

**PowerShift**

Our flagship decarbonization program, PowerShift, aims to make Vale's energy matrix cleaner through the use of renewable energy, alternative fuels and more efficient operations using new technologies.

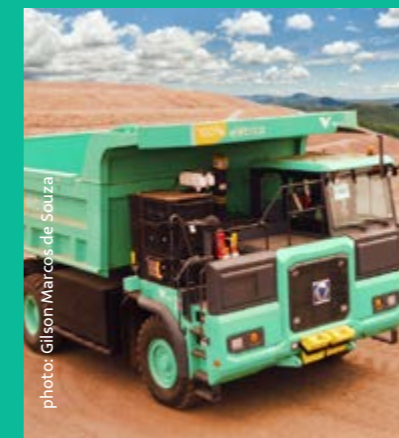
To enhance its impact, PowerShift partners with technology experts, research centers, suppliers, and other companies in the industry.

**Major advances**

**Changes to the energy matrix in pelletizing**

We carried out a test at the Vargem Grande pelletizing plant to replace up to 50% of anthracite consumption with biochar. More industrial tests for the total replacement of coal are already scheduled for 2023. Pelletizing emissions from the use of anthracite alone account for about 14% of our total Scopes 1 and 2 emissions.

In 2022, Vale signed a contract for the use of natural gas at the São Luís Pelletizing Plant. With the conversion, scheduled to take place in 2024, Vale aims for all of its pelletizing plants to use gas instead of fuel oil as an energy source.



Inauguration of Vale's 1st 100% Electric Truck, at the Água Limpa Mine, Piracicaba River (MG), Brazil.

**Changes to the truck fleet**

In 2022, we started the pilot tests of two 72-ton battery-powered off-highway trucks. The first to be used by a global mining company, the vehicles emit no CO<sub>2</sub> during operation, as they replace diesel with electricity, and also reduce noise, minimizing the impact on neighboring communities. Emissions from off-highway diesel trucks currently account for about 9% of our total Scopes 1 and 2 emissions.

## Renewable energy in Brazil and worldwide

The goal of achieving 100% renewable electricity in Brazil (2025) and globally (2030) is directly linked to our ability to transform our energy matrix to meet our expected demand.

In 2022, electricity accounted for 30.2% of our energy consumption, with 86.67% coming from renewable sources. This percentage is even higher in Brazil, with 99.95% of our energy consumption from renewable sources, being met by concession contracts for our own assets, as well as by our power purchase agreements. This contracted renewable energy has been assured by certificates or statements from energy suppliers and has been audited by a third party.

In Canada, we recently signed a power purchase agreement (PPA) with Indigenous partners to provide wind power to our Voisey's Bay operations, thus partially replacing diesel oil consumption with renewable electricity. Commercial operation of the wind project is planned for 2026 and we are aimed at reducing emissions by 34,602 tCO<sub>2</sub>e annually – equivalent to 16% of the emissions from Voisey's Bay operations.

Our portfolio of generated electricity is 98.6% renewable and contributes directly to our overall target. Vale's installed capacity in 2022 was 2.7 GW, mostly related to hydroelectric and wind generation assets, directly and indirectly owned, located in Brazil, Canada, and Indonesia, and our new solar project, *Sol do Cerrado*. These plants meet on average 61% of our global electricity consumption and 72% of consumption in Brazil, in addition to contributing to our goal to renewable energy<sup>1</sup>.

<sup>1</sup> Historical averages of global and Brazilian self-production percentages since 2017. In 2022, these percentages represented approximately 69% and 86%, respectively.

### *Sol do Cerrado* generates solar energy for Vale's operations

In November 2022, the *Sol Cerrado* project, in the municipality of Jaíba in Minas Gerais, began to generate renewable energy. The enterprise is one of the largest solar energy parks in Latin America, with an installed capacity of 766 Megawatts-peak. The project includes a substation and a 15 kilometer-long transmission line, with a voltage of 230,000 volts, connecting the Coletora *Sol do Cerrado* and Jaíba substations, from where the energy is delivered to the National Interconnected System.

The *Sol do Cerrado* Project, with investments totaling about USD 590 million, aims to generate renewable energy to meet 16% of Vale's estimated consumption by 2025, reducing our emissions by 134,000 tCO<sub>2</sub>e/year, the equivalent emissions of approximately 100,000 compact cars.

In line with Vale's commitment to promote a fair energy transition, a partnership was established involving the Jaíba city hall and the municipality's community, which enabled the construction of a Local Development Agenda (ADL). Among its key deliverables are the consolidation of a permanent diverse and representative participation forum; the development of an integrated vision and shared oversight; short, medium and long-term strategic planning; and investments in education and broad participation.

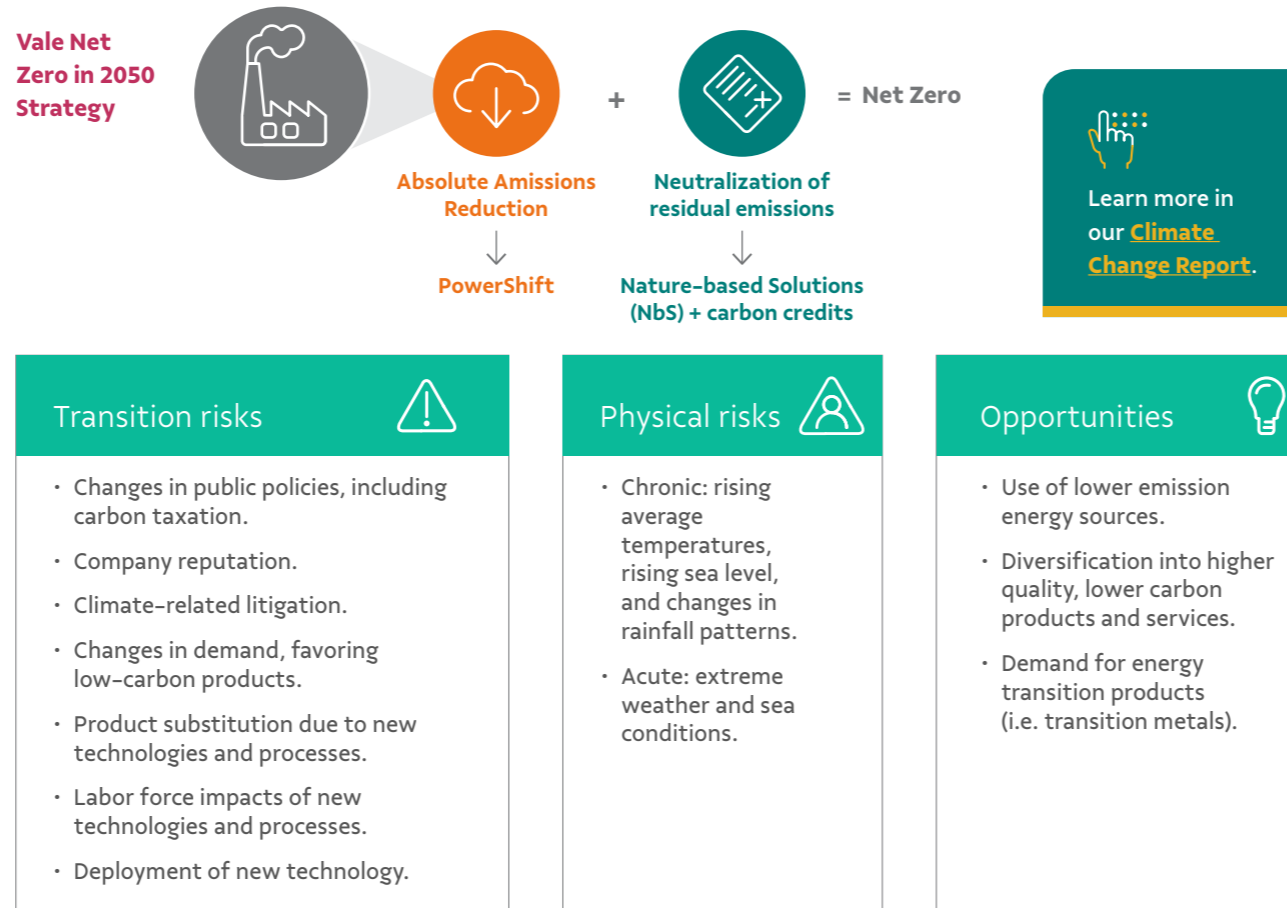
Learn more [here](#).

photo: Zé Palma



## Net zero goal

In addition to the absolute reduction of emissions through initiatives such as PowerShift, Vale's commitment to net zero Scopes 1 and 2 emissions by 2050 is based on the neutralization of residual emissions through initiatives that remove carbon from the atmosphere such as Nature-based Solutions (NbS) and qualified carbon credits aligned with best practices.



## Climate-related risks and opportunities

Guided by the TCFD, we use a risk matrix that considers the severity and likelihood of occurrence of risk events. In the case of risks related to climate change, Vale's analysis methodologies are divided into the impacts resulting from transition risks (regulatory, legal, technological, market and reputational changes) and physical risks (acute and chronic).

## Vale Climate Forecast

"Vale Climate Forecast" is a methodology, developed in conjunction with the ITV, that is intended to enable us to analyze and monitor the short- and long-term physical impacts caused by climate issues, such as changes in rainfall patterns and volumes, temperature variation, lightning incidence and storm occurrence for all the company's operations.

Long-term analyses have already been performed for the base metals operations in Canada and all operations in Pará and Maranhão, Brazil – including mines and railroads and the Ponta da Madeira Maritime Terminal. In the latter, in addition to the long-term analyses, it is already possible to make daily rainfall forecasts, which help in decision-making for the shipping and distribution operations of iron ore and other products, optimizing planning and minimizing risks.

## Just Transition

The risks arising from climate change have a significant impact on local communities, especially the most vulnerable ones, thus affecting their rights. In addition to the responsibility of ensuring the just transition associated with our assets and value chain, we recognize that Vale has a role in supporting these communities in adapting to and mitigating the impacts of climate change, while respecting human rights and promoting a positive social legacy.





**In this chapter:**

- The role of mining
- Low-carbon solutions
- Responsible sourcing
- Circular mining and new business

2

Solutions for the value chain

# 11. The role of mining

In a world of increasingly rapid transformation and instability, mining continues to be challenged to deliver the materials required not only to meet global needs, but also to contribute to the decarbonization of the economy. This takes place in the context of the evolution of industry practices in search of a sustainable model.

Future trends for mining can be grouped into five categories that influence the strategy and attractiveness of companies: demographics, geopolitics, supply, energy transition and decarbonization, and mining of the future.

The first three talk to supply challenges in a world experiencing

growing demand at the same time as geopolitical and national policy constraints, inflationary pressure, climate change, energy security and the disruption of supply chains as a result of the pandemic.

The other two (energy transition and decarbonization), on the other hand, are the challenges and opportunities linked to the transformation of practices, portfolio management, and the relationship of the mining sector with its stakeholders. They include low-carbon mining, a circular economy, data-driven mining, the carbon market and new sustainable steel production routes.

An energy matrix that is predominantly renewable, becomes a competitive advantage in delivering ore that is aligned with new requirements.

## Decarbonization

The mineral production chain is at the beginning of a long and complex value chain, which will be critical in the transition to a low-carbon economy (demand for steel and base metals for renewable energies, batteries, etc.). However, it is also an industry, with great mobilization capacity, which can lead global decarbonization efforts.

In an increasingly capital-intensive sector, decarbonization is an opportunity to generate revenue – with the sale of raw materials needed for the energy transition and with low-carbon products – if a potential reduction in the cost of capital through access to new financing formats is anchored in sustainability.

As the European Union nears the implementation of the Carbon Border Adjustment Mechanism (CBAM), of the Carbon Border Adjustment Mechanism (CBAM), which will tax imported goods based on direct and indirect emissions resulting from their production, industries including mining must comply with new demands.

The mining sector will have to focus on decarbonization initiatives that also address Scope 3 emissions, i.e.

beyond those not as a result of direct activities. Helping to reduce these emissions may well have a greater impact, compared to reducing our own emissions (Scopes 1 and 2), given that, according to the Transition Pathway Initiative, they are responsible for more than 90% of the total emissions of the main mining companies.

Proper carbon tracking is likely to be an essential condition to participate in this new context, to the extent that a product's carbon footprint is likely to become an important element in the pricing of the ores available on the market.

## Technologies for climate transition

There are three important transitions to consider for mining in a low-carbon world. The first is the shift in energy source from diesel to electricity or alternative fuels. Second, digitalization, which results in higher productivity and more sustainable use of resources, while reducing the cost of inputs. Digital transformation is likely to be an essential factor for acquiring and keeping our license to operate. In digital mining, operations will be connected, improving safety, productivity, and efficiency. The third is automation, which is also



photo: Vale Archive

likely to increase productivity and change work patterns.

## Pact with society

The creation of real value sharing, benefiting the communities surrounding mining projects, is an essential requirement for the success of new ventures. Securing and maintaining a social license to operate from local communities continues to be a challenge for the mining industry. This requires building relationships that include free, prior, and informed consent before the deployment of projects; rehabilitation initiatives and considered future uses of closed mines; and offering employment opportunities and local development.

In this sense, a commitment to and respect for human rights,

besides supporting a just and inclusive transition, becomes a condition for the industry's sustainability.

## Strategy

Vale has developed a strategy based on three pillars, which is aimed at addressing and preparing the company to address this objective: sustainable mining, the development of low-carbon solutions and maintaining discipline in resource allocation.

These are solutions that focus on safety, reparation, cultural transformation, fighting poverty, positive environmental impact, and climate change mitigation and adaptation. They are applied to Vale's portfolio of iron ore and base metals (especially those aimed at the energy transition).



photo: Keila Silva

# 12. Low-carbon solutions

GRI 3-3 | 201-2

## What do stakeholders expect from Vale?

Mitigation and adaptation measures to address climate change, alignment of goals with those of the Paris Agreement, transparency in annual performance and the development of intermediate goals to reduce emissions, and in the demonstration of the capacity to deliver on the commitments made.

The global context of decarbonization is spurring Vale to develop low-carbon solutions both to reduce the volume of our Scope 3 emissions, ensuring access to markets that will assess carbon footprint in product pricing, and to enable our customers to reduce their own Scopes 1 and 2 emissions.

In relation to our iron-ore business, for example, customers and investors expect us to contribute to the development of sustainable ore and steel markets through meeting the demand for high-quality products and greater efficiency through a portfolio with more solutions and by improving our operational flexibility to deliver quality products.

To this end, we have increased the production of materials with higher added value, such as pellets and briquettes; in building partnerships for the development of low-carbon solutions; in creating solutions to increase the iron ore content of our products; in circular mining strategies for the better utilization of tailings from operations; and in reviewing our production process with the goal of ensuring more flexibility, efficiency and alignment with new global production standards.

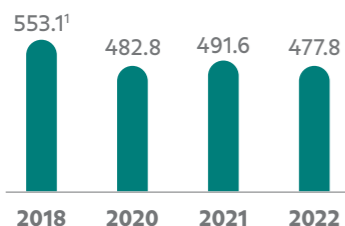
In base metals, there is a relevant opportunity to boost the energy transition through products such as copper – aligned with practices strongly anchored in ESG performance, low carbon emissions, and quality relationships with the communities surrounding our operations. As such, Vale is investing in the growth of our North Atlantic projects and the stabilization of our South Atlantic projects, through a consistent project pipeline that are aimed at enabling production growth.

The global context of decarbonization requires Vale to develop low-carbon solutions both to reduce the volume of our Scope 3 emissions, ensuring access to markets that will assess carbon footprint in product pricing.



## Scope 3 GHG emissions GRI 305-3

(In MtCO<sub>2</sub>e)



1 Base year 2018 Scope 3 emissions reduced from 585 million tons of CO<sub>2</sub>e to 553 million CO<sub>2</sub>e, due to divestments in coal and ferroalloys assets, manganese operations (except Simões Filho plant), Centro-Oeste System and Vale Nickel (Dalian) Co., carried out in 2022. GRI 2-4  
 2 Method for achieving a linear absolute reduction in GHG emissions in the target year relative to the base year.  
 3 Calculation methodology: SBTi – TWG-INF-002 | Version 4.2 April 2021.  
 4 As it foresees the use of carbon credits to achieve the commitment, the SBTi has formalized that it will not proceed with validating our Scope 3 target, nor will it separately validate the goal of Scopes 1 and 2 target.  
 5 Vale's 2022 GHG inventory results were audited by a third party.  
 6 An increase in Vale's Scope 3 emissions is expected due to the growth in sales volume, due to a perspective of increased demand for our products.

## Reduction of GHG in the value chain

Some sectors in our value chain are hard-to-abate sectors, such as steelmaking and shipping, which together account for 93% of our Scope 3 emissions.

Our goal of a 15% reduction in Scope 3 net emissions was set using the absolute shrinkage approach<sup>2</sup>, a science-based methodology<sup>3</sup>, and aligned with the 2°C temperature increase scenario. In working to achieve our commitments, we intend to rely on three main pillars: a high-quality product portfolio, partnerships with customers and suppliers, and the limited use of high-integrity carbon credits<sup>4</sup>, following principles such as additionality, permanence, transparency, and contribution to sustainable development. The use of carbon credits will be a maximum of 20% of the absolute reduction of Scope 3 emissions by 2035, equivalent to 17 MtCO<sub>2</sub>e. Due to low-carbon technologies and climate policy uncertainties, we intend for our targets to be reviewed in 2025 and every five years.

Scope 3 emissions totaled, in 2022, 477.8 million tons of CO<sub>2</sub>e<sup>5</sup>, representing a reduction of 3% compared to 2021, and a decrease of 14% compared to the 2018 base year<sup>6</sup>. This variation in emissions is mainly due to the reduction in the sales volume of our products, especially pellets, by 41%, and iron ore, by 12%, compared to 2018. [GRI 305-3](#)

Scope 3 emissions, represent around 98% of Vale's total emissions, about 97% of Vale's Scope 3 emissions are downstream in its value chain, mainly in steelmaking, from processing, transportation and use of the products we supply. Upstream, on the other hand, emissions are associated with suppliers of raw materials, products and services, as well as their transportation, and totaled about 3% of Scope 3 emissions in 2022. [Read more about our suppliers in Responsible Sourcing.](#)

## High-quality product portfolio

### Iron ore

Vale aims to supply approximately 100 million tons of agglomerated products over the next 15 to 20 years, split between agglomerates for blast furnaces and for direct reduction. The production of these agglomerated products are expected to see lower fossil fuel consumption, particulate emissions, and water use.

In 2023, start-up is planned for two briquette plants that are under construction in Tubarão, with a total expected capacity of six million tons per year. Another seven are under evaluation, including co-located plants.

### Base metals

Demand for base metals in the coming decades is likely to be driven by decarbonization and the energy transition. There is likely to be growth in the electric vehicle industry, where battery components are made from nickel and copper. The trend towards electrification based on renewable energy sources is likely to provide for the expansion of solar and wind projects, which are copper-intensive.

Our products are low-carbon certified and more than 86% of the electricity used in our production processes

comes from clean sources, contributing significantly to the energy transition and to a sustainable economy.

In 2022, we signed long-term agreements with General Motors Co., Northvolt, and Tesla Inc to supply nickel from Vale's Canadian operations. These initiatives are in line with our strategy to broaden our exposure to the electric vehicle industry, leveraging our market leadership as the largest producer of refined nickel in North America.



photo: Pedro Rubens

Our products are low-carbon certified and more than 90% of the electricity used in our production processes comes from clean sources, contributing significantly to the energy transition and to a sustainable economy.

### Carbon Footprint

In 2022, we progressed in measuring the carbon footprints of Vale's products. The quantification and reporting of products' carbon footprints are based on the ISO 14067 Carbon Footprint of Products and Product Lifecycle Accounting and Reporting Standard of the GHG Protocol. The cradle-to-gate approach was used, covering emissions generated from mineral extraction, processing and internal transport, pelletizing (where applicable), as well as emissions from the production of inputs (Scope 3 Upstream).

- Carbon footprints have been calculated and verified by third parties for 100% of our Class 1 nickel products, and for 75% of nickel, copper and cobalt products;
- 40% of the volume of ferrous products sold in 2021 have carbon footprints calculated, of which approximately 35% have had their footprints verified by a third party. It is expected that we will have 70% of products covered and verified by the end of 2023.

## Partnerships with customers and suppliers

As steelmaking is a hard-to-abate sector, it will require our leadership in developing low-carbon solutions through a customer-centered approach, the rapid development of high-quality products, and customized business models. We have invested in innovation and technology with the aim of offering solutions for the steel industry, seeking an increasingly sustainable future for mining.



The products of Dillinger and Saarstahl are already part of today's energy and mobility transition. Together with strong partners like Vale, we will continue pursuing the path to climate-neutral production. By working together to develop solutions for decarbonization in steelmaking, we can pool our expertise and achieve the next milestones on the road to our green transformation."

**Dr. Karl-Ulrich Köhler**, Chairman of the Board of Management of SHS – Stahl-Holding-Saar and CEO of Dillinger and Saarstahl

In order to strengthen our partnerships, we signed Memoranda of Understanding with relevant steel customers in 2022:

- **German steelmaker Stahl-Holding-Saar GmbH & Co. KGaA (SHS)**, to jointly explore initiatives focused on the carbon-neutral steel production process, such as the use of Vale's iron

ore briquette and direct reduction pellets in the steel mill; a briquette plant located close to SHS's facilities; and TecnoRed's technology.

- **Nippon Steel Corporation ("Nippon Steel")**, which is Japan's largest integrated steel producer and one of the world's leading steel solutions providers focused on the carbon-neutral steel production process. Vale and Nippon Steel intend to jointly explore solutions for the use of metallics such as direct reduction of iron ore (DRI) and pig iron produced by TecnoRed technology; and the use of our briquettes in the manufacturing process of iron and other lower carbon footprint products.



As a global steelmaker, transitioning to the production of low carbon emissions steel in accordance with the Paris Agreement is of fundamental importance to ArcelorMittal. We must achieve this in a just and responsible manner providing safe, decent and inclusive environments throughout the value chain for both workers and affected communities. We see third party certified multi-stakeholder standards like ResponsibleSteel™ and the Initiative for Responsible Mining Assurance (IRMA) as key enablers, and we seek to work with likeminded partners."

**James Streater**, Head of Sustainable Development for the ArcelorMittal Group

## Expanding Low-Carbon Solutions in the Middle East

In 2022, we signed agreements to establish mega hubs in Saudi Arabia, the United Arab Emirates, and Oman with the goal of developing low-carbon products for the steel industry, especially Hot Briquetted Iron (HBI) and steel products to supply local and transoceanic markets, with a significant reduction in CO<sub>2</sub>e emissions.

HBI production using natural gas emits approximately 60% less CO<sub>2</sub>e when compared to pig iron production. In the future, the replacement of natural gas with hydrogen and the use of renewable energy may reduce these emissions considerably.

Under the agreements, Vale will build and operate iron ore concentration and briquetting plants at the hubs, which are intended to help ensure the supply of high-quality agglomerated products. The partners, in turn, will provide the necessary logistical infrastructure. The mega hubs should supply different markets around the world, further supporting the decarbonization of the steel industry.

### Navigation

We are committed to supporting the shipping industry in meeting the goals of the International Maritime Organization (IMO), which include reducing member countries' emissions intensity by 40% by 2030 and absolute emissions by 50% by 2050, when compared to 2008 levels.

In 2022, Vale achieved a major milestone for the adoption of alternative, lower carbon emission fuels for shipping. The multi-fuel tanks initiative is part of the Ecoshipping program, developed by Vale for the use of new technologies and modernization of the fleet. The emissions reduction from ships in the Guaibamax category<sup>1</sup> is estimated at between 40% and 80% when powered by methanol and ammonia, or up to 23% when using liquefied natural gas (LNG).

In addition to incorporating alternative fuels, Vale has developed innovative energy efficiency technologies. In 2021, we launched the first ore carrier equipped with rotating sails and the first Guaibamax ship to use air lubrication system.

### High-integrity carbon credits

Vale, through the Vale Fund, and the Algar Group, through Algar Farming, signed an agreement to purchase high-integrity forest carbon credits.

It is the first REDD+ project to integrate the Forestry Goal 2030 and is equivalent to 133,000 credits (approximately 50,000 hectares of forest)<sup>2</sup>. The intention in 2023 is to strengthen the partnership with the implementation of social and environmental impact actions in addition to carbon reduction initiatives.

The project, which started in 2017, takes place at Algar Farming's Fazenda Pacajá in northern Pará and aims to protect an area of more than 140,000 hectares of native forest in the Amazon biome. It is estimated that over the 30-year duration of the project, it will be possible to avoid the emission of approximately 40 million tons of CO<sub>2</sub> into the atmosphere.

<sup>1</sup> Guaibamax VLOC (Very Large Ore Carrier) with 325,000 ton capacity.

<sup>2</sup> REDD+ credits will not be used to achieve the Scope 3 goal, given that removal credits for neutralization are required.

# 13. Responsible sourcing GRI 2-6

By the end of 2022, Vale's supplier base was made up of about 18,000 suppliers, including consumer goods companies, materials and service providers, and consulting firms. Supplying quality products and agile services is strategically key to our business. We believe our value chain has a direct influence on the impacts we have on nature, on communities, and on the economy. That is why we must manage risks and opportunities to help ensure responsible practices aim to that guarantee the continuity and competitiveness of our business.

Before starting a business relationship with Vale, all our suppliers undergo a Due Diligence process, where a reputational assessment is undertaken based on public information, an established risk matrix, and the scope of work to be performed. Suppliers and contractors that have their own Code of Conduct aligned to the United Nations Global Compact Principles may commit to act in accordance with their own document. Those suppliers that do not have their own Code of Conduct must agree to commit to [Vale's Principles of Conduct for Contractors](#). In addition, we request the submission of supporting documents on good practices for suppliers that have identified warning signs or for those belonging to certain risk categories.

We select suppliers considering objective technical, safety, and economic criteria in accordance with legislation and internal

standards. Based on these criteria, suppliers are periodically monitored on their social, environmental and human rights performance, as well as relationships with government.

Vale is committed to helping develop the areas where we operate. In 2022, procurement spending with local suppliers accounted for 56% of our total procurement spending in the period, which stood at USD 11.1 billion.

In 2022, we developed a Supply Chain Criticality Matrix, prepared in alignment with the ISO 20400 Sustainable Procurement guidelines and based on the segmentation of our active supplier base in Brazil, considered the following:

1. Grouping suppliers into 54 macro-groups, considering categories with similar production processes and/or labor profiles;
2. Analysis of ESG impacts and risks for each macro-group considering 22 hotspots including risks related to the intensity of GHG emissions, business ethics, or exposure to slave labor;
3. Plotting of each macro-group of supply categories and hotspots according to (1) level of severity and likelihood of ESG impact and (2) level of mutual responsibility for any impact (reputational, legal etc.).



## Suppliers and critical topics

**Ethics and Compliance:** Vale wants to work with suppliers who are committed to operating their business in a responsible and ethical manner, in compliance with our anti-corruption principles. The [Principles of Conduct for Contractors](#), published in 2022, allows us to share our values and ethical principles with suppliers and other third parties who work with us. This document reinforces that the Whistleblower Channel can be accessed by anyone, inside or outside Vale, who wants to report a suspected violation of our [Code of Conduct](#).

**Climate Change:** We are committed to engaging our suppliers on climate change and on the improvement of their emissions management. Since 2011, we have encouraged suppliers to pursue emissions management through a contractual clause and completion of an annual GHG questionnaire. Since 2020, Vale suppliers considered key in terms of emissions in the supply chain are invited annually to participate in the CDP Supply Chain Program.

In 2022, 492 suppliers were selected, with an 84% response

rate (412 suppliers). This result is 10% higher than the previous cycle, reflecting greater engagement by our suppliers with climate change issues. Of these respondents, 192 participated in all three cycles of the CDP, which allows us to show their continuous commitment to managing the topic. In 2022, about 28% of the suppliers evaluated were classified as leaders or as having good management on the subject. Vale improved its ranking in the CDP Supplier Engagement Rating appearing with A-list Companies, and being among the 15% of the leading companies in the “Metallic Mineral Mining Group” and among the 8% best rated for supplier engagement on Climate Change.

**Human Rights:** Before starting a business relationship with Vale, all our suppliers are subjected to a due diligence, assessment, based on public information and the scope of work to be performed.

This verification process is part of our Ethics and Compliance Program. This includes human rights due diligence. The process starts during the registration stage and continues through to supplier

contract management. Risk assessment, application of a self-diagnosis questionnaire, document and field inspections, and monitoring of supplier action plans are some of the practices intensified over the past three years. In 2022, 432 suppliers in Brazil were classified as high risk in respect of human rights due to the characteristics of their contract with Vale. Of these suppliers, 118 had their risk level reduced based on the self-diagnostic questionnaire, 71 of them underwent training and 80 underwent human rights inspections.

The main results of the inspections pointed to weaknesses in the fight against the sexual exploitation of children and adolescents, the dissemination and operation of whistleblower channels, and problems in labor relations and working conditions. Suppliers with identified vulnerabilities were asked to draw up an action plan and must periodically report progress to Vale.

## Evaluation and monitoring

Supplier management is guided by adherence to compliance standards, which include health and safety, social and environmental issues, ethics and integrity, and human rights. It covers regulations and processes for risk monitoring and mitigation, and is incorporated into our management system, the VPS.

Before start a relationship commercial with Vale, all our suppliers pass by due diligence, in that an assessment is made based on public information and the scope of work to be played. This process verification is part of our Ethics & Compliance Program

## Partilhar Program

In 2020, the “Partilhar” (meaning Share) program was launched to foster greater socioeconomic development in the regions where Vale operates, joining forces with our supply chain. Its methodology and concepts were incorporated into Vale’s supplier contracting process, added to the technical and commercial aspects, in addition to safety. As a result of the program, participating suppliers invested more than USD 1.7 million in 2022 in local social actions that benefited the areas where Vale operates.



To learn more here about the *Partilhar* program, access [here](#).

Vale improved its ranking in the CDP Supplier Engagement Rating appearing among the **15% of the leading companies** in the “Metallic Mineral Mining Group” and **8% best rated** for supplier engagement on Climate Change.

Vale is committed to responsibly producing and sourcing minerals and metals feed sand requires all leaders, employees, suppliers, and contractors to uphold this commitment. To this end, the Company has implemented due diligence processes.

## Risk Management in the Base Metals Supply Chain

Vale Base Metals is committed to responsibly producing and sourcing minerals and metals feeds, including nickel, copper, cobalt, platinum, palladium, ruthenium, rhodium, iridium, gold, and silver, and that all leaders, employees, suppliers, and contractors uphold this commitment. To this end, the Company has implemented due diligence processes to assess and manage the risks outlined in Annex II of the [OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas OECD Guidance](#)<sup>91</sup> (OECD Responsible Sourcing Requirements) and upheld by the Base Metals [Policy Statement](#) on Responsible Sourcing of Minerals and Metals. These processes incorporate third-party and supplier risk assessments, red flag identification, and implementation of risk management strategies to mitigate identified risks, including financing of

conflict, human rights abuses, bribery, and fraudulent misrepresentation of the origin of minerals, money laundering, and public or private security forces. We have an independent audit process that includes a review of management systems related to responsible sourcing, as well as an assessment of the effectiveness of the Company's efforts to mitigate risks in the supply chain. Several Base Metals refineries are in the process of obtaining third-party certification in line with OECD Responsible Sourcing Requirements.

In 2022, Vale Base Metals conducted third-party CopperMark Joint Due Diligence Standard (JDDS) assessments at three of our North Atlantic refineries: Copper Cliff Nickel Refinery (Ontario), Long Harbour Processing Plant (Newfoundland), and Clydach Nickel Refinery (Wales). The results of these assessments are [publicly available](#) for review.

Through our risk mitigation approach, Vale Base Metals strives to ensure responsible sourcing practices throughout our supply chain. We achieve this by collaborating with our suppliers, actively monitoring their performance, and maintaining a zero-tolerance policy towards human rights violations and support of non-state armed groups. Our responsible sourcing practices have yielded data that has strengthened our due diligence efforts, identifying feeds that are higher risk and prompting us to take enhanced due diligence measures to mitigate those risks.

Vale is a member of the Extractive Industries Transparency Initiative ([EITI](#)) and is committed to disclosing its due diligence processes in its EITI reports. We also disclose information on payments made to governments in line with the EITI criteria and principles. We are committed to continuously improving our responsible sourcing practices and maintaining transparency in our operations.

# 14. Circular mining and new business

The circular economy is replacing the current linear model of extract, produce, and discard, which is reaching its physical limits. It is an alternative model based on a new type of relationship with natural resources and their use by society. It is based on the practice of recycling products that reach the end of their useful life. But this is only one part of a much broader concept, which involves rethinking the way products are designed, manufactured and marketed so that they generate less waste in manufacturing and throughout their life cycle, are more durable, and can be reused for other purposes.

Thus, the circular economy has become a key focus in solving critical problems such as global warming, material scarcity, and the correct disposal of tailings.

In this sense, Vale has been exploring initiatives that contribute to circular mining, such as reprocessing waste generated (tailings) from iron ore production process to create ore-sand, a byproduct alternative to riverbed or coastal sand mining. In 2021, we will begin marketing Brucutu sand, with quality certified by specialized laboratories, with 225,000 tons available to be used in applications such as concrete, mortar, precast,

artifacts, cement and road paving. Each ton of sand produced represents one ton less of tailings being disposed of in piles or dams.

In 2022, we expanded sand operations, allocating 530,000 tons from mines such as Brucutu and Viga and internal applications such as the Cauê Test Track, to commercialization for civil construction uses, resulting in several commercial sand contracts. We also contributed to a study carried out by the University of Queensland and University of Geneva, and presented at UNEA<sup>1</sup>, which reinforces the potential of sand from the iron ore production

process as a sustainable alternative to the predatory extraction of sand from river beds.

In 2022, advances were also made in relation to circular mining in Base Metals operations, such as:

- Use of 360 t of nickel from waste ores
- Reprocessing 5 kt of copper contained in Thompson precipitates
- 2 kt of recycled nickel in slags.

The circular economy is replacing the current linear model of extract, produce, and discard, which is reaching its physical limits. It is an alternative model based on a new type of relationship with natural resources and their use by society.

## Mineral waste management

Mining-metallurgical waste includes waste rock, tailings and slag generated in the metallurgical processing of nickel, copper, cobalt, iron ore, and manganese.

### Total of mining-metallurgical waste GRI G4 MM3

(In millions of tons)

	2020	2021	2022 <sup>2</sup>
Iron ore – waste rock	191.6	207.6	208.5
Iron ore – tailings	45.4	47.2	46.9
Other business areas	290.7	260.4	150.6
<b>Total</b>	<b>527.7</b>	<b>515.2</b>	<b>406.0</b>

The employee Jakscelle Silva, at the factory of blocks produced from ore tailings at Mina do Pico (MG), Brazil



Photo: Patricia Pellegrino

<sup>1</sup> 5th session of the United Nations Environment Assembly presented in February 2022.

<sup>2</sup> The reporting limit considered for the data in the table is Vale Global, so for 2022 the report does not consider the mineral residues of the units sold throughout the year (Moatize, Mineração Corumbaense Reunida, Manganês plants and Vale Nickel (Dalian) Co.)



photo: Leo Lopes

**In this chapter:**

Governance

Economic performance

3

Discipline  
in capital  
allocation

# 15. Governance

GRI 2-9 | 2-13 | 3-3

## What do stakeholders expect from Vale?

Information about how the Board of Directors is constituted, measures for independence and transparency of decision-making and the alignment between speech and practice.

From early 2023, we will have a new design for the Executive Committee, linked to the Vale presidency (see organization chart on next page).

In the new configuration, four executive vice-presidencies have been appointed: Iron Ore Solutions, Operations, Projects, and Technical. The functions of the former executive vice-presidencies of Strategy and Business Transformation, Global Business Solutions, and Security and Operational Excellence have been incorporated into this new structure.

The changes are intended to provide greater focus on our core assets, ensuring agile improvement and innovation in the development of products and solutions for the global energy transition. The new design is the result of the strategic initiative to simplify our portfolio, which is now focused exclusively on businesses and geographies in which we have clear competitive advantages.

1

In 2022, Vale's Board of Directors approved the cancellation of **353,569,147 common shares**

issued by the Company acquired in a previous repurchase program and held in treasury, with no reduction in the value of its capital.

**Vale's migration to the Corporation model, or company with dispersed capital – with no defined control, is a landmark in the company's history.**

2

## Changes in the By-laws

### With emphasis on:

- I. **strengthening the concept of a Brazilian company** for purposes of compliance with mining regulations;
- II. **updating the article related to the Company's share capital**, in view of the cancellation of shares;
- III. **adjustment in the nomenclature from "Executive Board" to "Executive Committee"**;
- IV. **adjustment in the nomenclature from "Executive Officer" to "Executive Vice President" and from "Chief Executive Officer" to "President"**.

- **Changes to the meetings of the Board of Directors and the Executive Board**, including the provision for electronic and/or mixed form deliberations. Thus, a Board member who is unable to attend meetings can send their vote in writing. Also removed was Prerogative of the Chief Executive Officer decide matters individually of collegiate competence, in order to reflect practice.

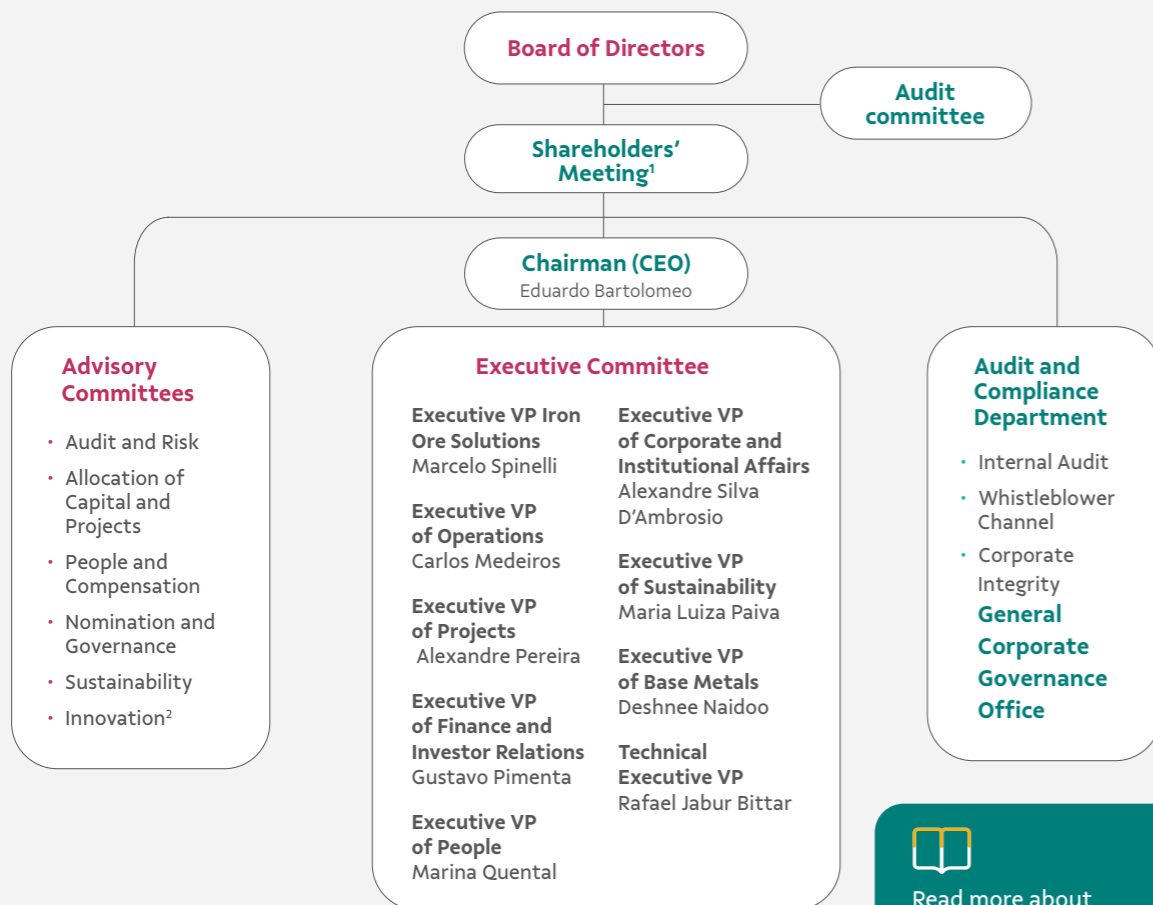
- **Changes in the responsibilities of the Board of Directors and the Executive Committee**, aiming at concentrating the Board's performance on the strategic direction and delegating executive management duties to the Committee, observing criteria established by the Board itself.

- **New structure for the Board of Directors' Advisory Committees**, with a reduction from seven to five permanent committees, detailed below.

**Infographic with Vale's Governance Structure** GRI 2-9

In 2022, to focus the Board of Directors' activities on Vale's strategic direction, the Board's duties were revised, including a broad review of the Delegation Policy. The statutory advisory committees were reduced from seven to five: the Innovation Committee became non-permanent and non-statutory; the duties of the former Operational

Excellence and Risk Committee relating to the Company's risks were incorporated into by the Audit and Risks Committee; operational excellence is now monitored directly by the Executive Committee, reporting to the Board of Directors. The advisory committees now comprise only members of the Board of Directors.



<sup>1</sup> At Vale, the CEO doesn't accumulate the position of chairman of the Board of Directors. GRI 2-11  
<sup>2</sup> Non-statutory and non-permanent committee.

Read more about Governance Practices and see the complete profile of Vale's Leadership in our [Annual Report](#).

**Board of Directors**

The Board of Directors is responsible for overseeing Vale's guidelines and strategic plans, monitoring and evaluating our economic and financial performance, appointing and evaluating the members of the Executive Committee, and deliberating on corporate policies, among other duties. Its mission is to protect Vale's assets and maximize, in the long term, the return on shareholders' investment, acting within the highest ethical principles, in order to maintain the company's longevity in line with Vale's purpose. GRI 2-12 | 2-13

The Board comprises 13 members, eight of whom are independent, including the Chairman of the Board, and most of whom have expertise in mining (or related industry), ESG, finance, and cultural transformation. Of the 13 current members of the Board (term of office 2021-2023), one is an employees representative, and the others are elected by nomination from the Nominating and Governance Committee (at that time still called the Nominating Committee). GRI 2-10

<sup>3</sup> As of December 2022, this duty passed to the Nominating and Governance Committee.

**Currently, our committees are:**

- Capital Allocation and Projects Committee
- Sustainability Committee
- People and Compensation Committee
- Audit and Risk Committee
- Nominating and Governance Committee
- Innovation Committee (non-statutory and non-permanent)

**Advisory Committees**

GRI 2-13 | 2-14

The Advisory Committees assist the Board of Directors on specific topics in order to provide greater efficiency and quality to the Board's decisions. Each year, the Advisory Committees define their work plan for priority topics. Requests for discussions and evaluations from the Committee itself, the Board of Directors or the Executive Committee are added as needed throughout the year, dynamically.

**Performance assessment**

GRI 2-17 | 2-18

We believe a robust and constructive assessment of the Board of Directors and other bodies is essential for

good corporate governance. Our Board conducts annual performance assessments – with the support of the Nominating and Governance Committee for analysis and recommendation of the evaluation methodology. Based on the results, a development plan is created for the Board, aimed at continuous improvement and focused on the evolution of our governance.

In 2022, the performance assessment process for the Board of Directors and the Advisory Committees was supported by the Personnel, Compensation and Governance Committee<sup>3</sup>, and covered, among other aspects, for each Advisory Committee:

- (a) its composition and structure;
- (b) its dynamics;
- (c) its processes and support structures; and
- (d) its contributions to the execution of the Company's objectives, in addition to highlighting opportunities for improvement and providing feedback to members.

This process included not only the evaluation of the Advisory Committees as a whole, but also individual self-assessments by board members. This was in addition to peer evaluations, considering aspects such as contribution, participation and engagement, competencies, and personal profile. The Board assessment also included the participation of the Executive Directors (360° evaluation).



## Share Capital

As of December 31, 2022, the capital of Vale S.A. consisted of 4,778,889,251 common shares and 12 preferred shares of a special class (golden shares).

The consolidated results of the assessments were submitted to the Board of Directors while the individual results were shared with the Chairman of the Board of Directors for further feedback to each board member.

## Fiscal Council

The Fiscal Council is a permanent body, which performs independent oversight of the Executive Committee and the Board of Directors and seeks, through the principles of transparency, equity, and accountability, to contribute to Vale's best possible performance. Its duties include the supervision of the

management, review of the annual management reports and financial statements and maintaining a direct communication channel with the external and internal auditors.

## Executive Committee

Vale's Executive Committee is responsible for executing the business strategy defined by the Board of Directors, developing plans and projects and ensuring the company's efficient operational and financial performance. The Board of Directors appoints the members of the Executive Committee, and the President is responsible for submitting the candidates for

the positions of Vice President to the Board. **GRI 2-13**

After changes made in early 2023, the Executive Committee comprises the President and nine Executive Vice Presidents, eight of whom are statutory.

Learn more [here](#) about the members of the Board of Directors and the Board's formation and the composition of the Advisory Committees. **GRI 2-9 | 2-10 | 2-12**

## Leadership compensation

**GRI 2-19 | 2-20**

As detailed in **Vale's By-laws**, the overall annual compensation of the members of the Board of Directors, Executive Committee, Fiscal Council and Advisory Committees is established at the Annual Shareholders' Meeting. The Board of Directors, with the support of the People and Compensation Committee, is responsible for distributing the compensation approved by the Shareholders' Meeting among the members of the Executive Committee.

The variable compensation of the members of the Executive Committee includes, among others, metrics focused on ESG issues, both in short-term and long-term compensation.

### Short term

- In 2022, the performance targets were established in the following proportion, respectively: 65%–75% collective targets and 25%–35% individual targets, according to the scope of each area.
- We seek, through a model focused on collective goals, to stimulate mutual collaboration based on the key behavior "Sense of Ownership". In this context, focus

and relevance were given to critical objectives related to safety, risk and sustainability, EBITDA, and the strategic objectives for achieving the company's ambitions.

- In the collective component, 30%–40% of the targets are tied to non-financial indicators and ESG topics, and 35% are tied to financial targets.
- Since 2020, the Health, Safety, Geotechnics, Reparation and Compliance areas do not have financial and production results in their target dashboard, representing Vale's focus on Risk Management as a priority.
- For 2023, targets related to capital allocation, process-related safety events, indicators of black people in leadership positions, and volume guidance are slated to be included, in addition to the maintenance of costs, among other KPIs aligned to the achievement of the company's objectives.

### Long term

- The long-term compensation plans offered by Vale are VSP and Matching.
- In 2020, indicators related to ESG topics were included in the VSP, with 20% weight. Since 2022, this has risen to 25%, placing more focus on these issues.

- Since 2021, the VSP compensates its executives in common shares of the Company (substituting cash payment linked to the share price) and includes the payment, at the end of each cycle, of "virtual dividends".
- From 2023, the VSP will no longer have a trigger linked to Total Shareholder Return (TSR), which means even more focus and relevance for ESG-related KPIs. In addition, in 2023 it was decided to include ROIC (return on invested capital) metrics in the 2024 VSP with 25% weight, as an internal value creation goal, for greater alignment with investors and Vale's strategic objectives.
- Matching follows as a retention program and works as a partial deferral of the bonus in the form of shares issued by Vale. Executives must acquire shares in the Company using their own resources, and in doing so, receives the right to a share premium at the end of the 3-year cycle.

- The Matching program also includes the payment of "virtual dividends", which are paid by the company immediately after the distribution of dividends and/or IOC by Vale to the shareholders.

## Ethics and compliance GRI 3-3 | 205-2

Vale's Ethics and Compliance Program is structured to promote a culture of ethics and integrity through six elements focused on three different functions: prevention, detection and correction of misconduct.

### Prevention

Governance is structured with the aim of allowing the program to have the autonomy and independence necessary to help ensure the commitment of the entire organization to our ethical principles. The Audit and Compliance Department is responsible for the program with direct reporting to the Board of Directors, supervised by the Audit and Risk Committee and works in partnership with the Conduct and Integrity Committee. In 2022, an external audit was requested by the Audit and Risk Committee to verify the effectiveness of the program's processes. This external audit will be carried out every two years by a specialized independent consultancy firm.

One of the main references for our ethics and compliance culture is Vale's [Code of Conduct](#), which translates our values into ethical principles that are expected to guide all our decisions. Employees and members of top management are required to comply with our ethical principles when they join the company.

We also rely on other regulatory documents such as our Global Anti-Corruption Policy, our internal Global Anti-Corruption Manual, our Anti-Corruption Guide for suppliers and other third parties, our Global Conflicts of Interest Guidelines, our Principles of Conduct for Third Parties, and our Consequence Management Policy.

Read more [here](#).

Under the Communication and Training element of our work, we held an "Ethics Week" in 2022 which included the "Movement for Ethics", a global mobilization where leaders discussed three ethical dilemmas with their teams and had the opportunity

to reflect on each person's role in this process. This initiative involved more than 50,000 employees and more than 20,000 contractors. Another initiative was a new course on ethics for contractors working at Vale. There were also communications related to conflict of interest; rules about gifts, meals, and entertainment; and about the Whistleblower Channel.

We hosted 38 Ethics Talks with a focus on the Whistleblower Channel which gathered more than 3,000 employees in Brazil, Malaysia, Oman and the United Arab Emirates. During the December edition of Talk 360, which was attended by more than 42,000 people, actors from a theater company interpreted three ethical dilemmas, showing the importance of open and transparent dialogue, one of the key behaviors expected from employees.

Vale has zero tolerance for corruption and bribery. Our anti-corruption rules ensure compliance with all applicable

anti-corruption laws, including the U.S. Foreign Corrupt Practices Act (FCPA), the Brazilian Anti-Corruption Law (Law No. 12.846/2013), and local laws in each country in which we operate. Three actions on the topic stood out in 2022: (1) the launch of an anti-corruption online course; (2) customized training sessions for more than 1,300 employees of areas classified as priority groups due to exposure to the risk of corruption and (3) the Movement for Ethics, an action aimed at employees and contractors, where one of the dilemmas presented promoted reflection on anti-corruption behavior. In total, more than 60,000 employees were trained, representing 93% of Vale's workforce.

### Detection

In the Risks and Monitoring element, we closely monitor adherence to the guidelines of the Ethics and Compliance Program through tests, controls and continuous monitoring activities.

## What steps did we take in our efforts to manage the risk of corruption in 2022?

- **Seventeen controls are part of our risk matrix** and foster the management of risk of corruption at Vale.
- **Six of these controls are considered key** and are related to socio-environmental and institutional external expenditure, suppliers, hiring of public agents and training attendance.
- **120 control tests were performed** to evaluate the effectiveness of these controls.
- **95% of the transactions tested in 2022 were in compliance with the Program's guidelines.** All identified non-compliant transactions were addressed and no deviations were identified.



## Whistleblower Channel GRI 2-16, 2-25, 2-26 | 406-1

Another important mechanism for detecting misconduct at Vale is the **Whistleblower Channel**. Created in 2006, this channel can be accessed by anyone, inside or outside Vale, to report suspected cases or breaches of conduct with guaranteed confidentiality and non-retaliation for the whistleblower. Reports can be made by phone, electronically, or even by letter, and are received by an external, independent company generating a tracking protocol number.

Investigations are conducted by Vale's Whistleblower Channel

team, which reports to the Audit and Compliance Department. The process – audited by an external company – is designed to perform in an objective and impartial manner, guided by the company's Code of Conduct and Consequence Management Policy. Allegations of Corruption are investigated by Corporate Integrity.

In 2022, 6,736 reports were registered, and 6,600 registrations were closed. Of these 6,600, 60.3% were classified as allegations<sup>1</sup>, 27% as complaints<sup>2</sup>, and 13% as queries or out of scope reports or with insufficient information. In

relation to confirmed allegations, 62% were related to 'interpersonal relations', mostly linked to the inadequate management of people and inappropriate employee behavior. Sexual harassment, harassment and discrimination are also included in the 'interpersonal relations' category. These confirmed allegations included 36 cases of sexual harassment, eight cases of discrimination (four related to gender, two which were ethnic and racial, one related to sexual orientation and one to gender and disability) and 34 cases of harassment.

All confirmed cases of sexual harassment and discrimination were classified as being of high and very high severity, according to Vale's Consequence Management Policy, resulting in the termination of employment. The confirmed cases of harassment generated action plans including training, coaching, feedback, suspensions, warnings and, in the majority of cases, termination of employment. The cases involving contractors led to the companies being notified and the termination of the contracts of the people working with Vale.

The Whistleblower Channel is an important tool for the company to act preventively in promoting a culture of integrity.



photo: Zé Palma

Created in 2006, this channel can be accessed by anyone, inside or outside Vale, to report suspected cases or breaches of conduct with guaranteed confidentiality and non-retaliation for the whistleblower.

## New Channel

In 2022, Vale launched a new telephone channel for employees and contractors in Brazil to report sexual harassment or discrimination and receive empathetic support.

The channel is provided by specialized professionals from an external company. If the victim chooses to register an allegation, which can be done anonymously, the investigation is carried out by the Whistleblower Channel team. With this approach, which seeks to make the victim more comfortable, there has been an increase in the number of reports and an increase in the quality of the information and evidence shared by whistleblowers, thus speeding up the investigation process and also the conclusion, with the application of disciplinary measures established in the Consequence Management Policy.

Learn more [link](#).

- 1 Allegations are reports that represent potential violations of the Code of Conduct or non-compliance with policies and procedures or legislation or situations that may generate risk to the health and safety of employees, the community, and the environment in the regions where our company operates. Allegations are investigated by Vale's Whistleblower Channel.
- 2 Complaints are reports that do not represent violations of the Code of Conduct or non-compliance with policies and procedures or legislation. They do not require investigation and may be directed to the responsible areas for an appropriate response.

## Correction

The Consequence Management element allows the application of disciplinary measures for misconduct confirmed by the Whistleblower Channel or identified by leadership in the day-to-day work routine.

All violations confirmed by the Whistleblower Channel triggered corrective plans. A total of 2,941 corrective actions and disciplinary measures were undertaken, including 171 terminations of employment. In addition, we had termination of contractors, feedback, warnings and suspensions, process improvements, and other measures.

In addition to identifying and addressing violations of Vale's Code of Conduct, the Whistleblower Channel is an important tool for helping the company to act preventatively in promoting a culture of integrity and continuous improvement of our processes. In 2022, for example, 111 processes were improved based on opportunities identified through the Channel, and 171 training and retraining actions were promoted. More information on Vale's Whistleblower Channel and actions to promote a culture of ethics and integrity are found in the [Ethics and Compliance Program Report](#), which is available on our website.

## Proceedings in the CGU

In August 2022, the Brazilian Government's Office of the Comptroller General (CGU) published a decision on administrative accountability proceedings in which it concluded that Vale failed to submit reliable information in the National Mining Agency (ANM) system regarding the Brumadinho Dam I and that it issued a positive Declaration of Stability Condition for the structure in the period from June to September 2018, when, in the control agency's understanding, it should have been negative.

The CGU acknowledged that there was no corruption by Vale executives and that there was no involvement or tolerance by senior management in the situation. However, considering that by hindering ANM's inspection, the occurrence constituted an act harmful to the Public Administration the CGU set the fine at approximately USD 16.7 million, the minimum level established by law. Vale has appealed the decision and the outcome is pending.

## Compliance with laws and regulations GRI 2-27

In 2022, Vale received 18 fines and six non-monetary sanctions related to significant<sup>1</sup> cases of non-compliance with laws and regulations. In the same

year, the Company paid 21 fines related to non-compliance with laws and regulations, totaling USD 141,515.51, as detailed in the following tables and in the [ESG Databook](#).

### Fines and non-monetary sanctions received in the reporting year for significant cases<sup>1</sup>

Region	Environment		Society		Mining Regulation		Other <sup>1</sup>	
	Fines	Non-monetary sanctions	Fines	Non-monetary sanctions	Fines	Non-monetary sanctions	Fines	Non-monetary sanctions
South America	13 <sup>2</sup>	5 <sup>2</sup>	5 <sup>3</sup>	1 <sup>3</sup>	0	0	0	0
North America	0	0	0	0	0	0	0	0
Europe	0	0	0	0	0	0	0	0
Asia	0	0	0	0	0	0	0	0

Region	Fines paid in the reporting year				Total monetary value of fines paid in the reporting year (USD)			
	Environment	Society	Mining Regulation	Other <sup>1</sup>	Environment	Society	Mining Regulation	Other <sup>1</sup>
South America	8	0	13	0	USD 128,749.43	USD 0	USD 12,766.08	USD 0
North America	0	0	0	0	USD 0	USD 0	USD 0	USD 0
Europa	0	0	0	0	USD 0	USD 0	USD 0	USD 0
Asia	0	0	0	0	USD 0	USD 0	USD 0	USD 0

<sup>1</sup> For information about the concept considered for the term "significant", as well as other legal areas covered in the reporting, considered in the column "Others", see the Databook in tab "Glossary - Basis of Preparation".

<sup>2</sup> In 2022, the Company received 13 fines and 5 non-monetary sanctions for significant cases of non-compliance with environmental laws and regulations related to its operations in Brazil, which refer to issues such as alleged non-compliance with conditions, performance of activities without prior authorization from the environmental agency, damage to natural resources, natural or cultural heritage and/or human health, among others. Of the 5 non-monetary sanctions reported, 4 refer to lawsuits that are essentially civil in nature, but deal, in an accessory/indirect manner, with environmental issues and/or have environmental issues as their origin. These lawsuits deal with the repair of damage due to dam bursting and/or impacts associated with the decharacterization of such structures and emergency evacuations and preventive relocations due to changes in their safety level, and had decisions handed down in 2022, which will bring an environmental scope, which is why they are being reported in the item Environment. It is emphasized, finally, that the information provided in the table above is based on information extracted from the database of the Company's administrative and judicial proceedings system.

<sup>3</sup> In 2022, the Company received 5 fines and 1 non-monetary sanction for significant cases of non-compliance with civil laws and regulations related to its operations in Brazil, which refer to the alleged practice of acts harmful to the public administration and the alleged non-compliance with resolutions and clauses of the Term of Transaction and Adjustment of Conduct signed within the scope of the Mariana/MG reparation. The information provided in the table above is based on data extracted from the internal monitoring system of the Company's administrative and judicial proceedings, as well as from the notifications sent by the Interfederative Committee "CIF", an external agent of the governance of the Renova Foundation in the Mariana/MG reparation process. With this, we highlight that the fines, which resemble those of a contractual nature, are applied directly to the Renova Foundation and/or Samarco and forwarded to Vale and BHP in a subsidiarity manner.



photo: Leo Lopes

Vale constantly invests in the continuous evolution of systems for controlling and monitoring the impacts associated with our activities, and that any fines and non-monetary sanctions imposed on the Company are discussed in the respective processes, through the presentation of the appropriate defenses and appeals, based on the pertinent matters of fact and law.

## Unfair competition and conflicts of interest

GRI 2-15 | 206-1

The absence of conflicts of interest is one of the ethical principles of the new edition of [Vale's Code of Conduct](#). The company repudiates and rejects any action, influence or decision motivated by interests contrary to Vale's ethical standards.

In 2022, there were no lawsuits brought against Vale for anti-competitive behavior, antitrust and monopoly practices.

## Data privacy

Vale's data privacy guidelines were set out in a Global Policy, published in 2020, which presents the minimum conditions for Vale and other group companies to handle personal data. The company also has a direct communication channel with the privacy team and with the executive manager of the area, so that data subjects can make requests or submit complaints or suggestions. The communication channel, as well as the external privacy notice, are available on Vale's website.

<sup>1</sup> Earnings Before Interest, Taxes, Depreciation and Amortization.

<sup>2</sup> On December 30, 2022.

# 16. Economic performance

In 2022, Vale's adjusted EBITDA<sup>1</sup> from continuing operations was USD 19.8 billion. This result is 37% lower than in 2021. This variation was mainly due to the 23.6% lower iron ore fines realized prices. The reduction in EBITDA resulted in a decrease in Free Cash Flow from Operations: USD 5.7 billion in 2022 vs. USD 20.0 billion in 2021.

Capital expenditures in 2022, however, were 8% higher than the previous year, reaching USD 5.4 billion. This increase was mainly due to the *Sol do Cerrado* solar farm, Serra Sul 120, Capanema and Tubarão Briquette iron ore projects.

Gross debt and leases of USD 12.7 billion as of December 31, 2022 largely due to lower free cash flow from operations and further execution of the share buyback program. Expanded Net Debt,

meanwhile, is USD 14.1 billion, in line with the targeted leverage of USD 10 to 20 billion.

## Distribution of value

We paid USD 12.6 billion in dividends, interest on capital and share repurchases in 2022. Since 2020, Vale has returned USD 35 billion to shareholders, representing around 46% of our market capitalization<sup>2</sup>. Another USD 1.6 billion in dividends will be paid in March 2023, referring to our 2H22 results.

By early 2023, we had completed 43% of our third share repurchase program, with a disbursement of USD 6 billion to repurchase 357 million shares. Considering the three programs, the concentration of proceeds per share has increased by 15% since April 2021.

**USD 12.6 billion**

Paid in dividends, interest on capital and share repurchases in 2022

**USD 19.8 billion**

EBITDA adjusted from continuing operations in 2022

## Focusing and strengthening the core business

### Key results 2022:

#### Developing the electric vehicles value chain

Multi-year agreement to supply low-carbon nickel to Swedish lithium-cell producer Northvolt AB signed in March.

Finalized nickel supply contract with Tesla in May.

Long-term nickel supply agreement with General Motors signed in November – Vale will supply battery grade nickel sulfate, equivalent to 25ktpy<sup>1</sup> of contained nickel, starting in 2026.

#### Enhancing the iron ore solutions business

Vale signed three agreements in October for the development of mega hubs, industrial complexes intended to supply green solutions to the steel industry

MoU with Nippon Steel Corporation, Hunan Iron & Steel Group<sup>3</sup>, and SHS, among others, to pursue ironmaking solutions focused on the carbon-neutral steelmaking process, signed during 2022.

In July 2022, Vale announced the start of construction of the Zhongzhai pre-blending Project, a partnership with Shagang and Ningbo Zhoushan Port. Vale is committed to supplying part of the blended cargos, with high-quality products such as BRBF, and to provide technical assistance on blending activities.

Tecnored started the construction of the USD 309.8 million plant in April. Start-up is expected in 2025, with initial capacity of 250ktpy of green pig iron, potentially reaching 500ktpy in the future.

#### Responsible divestment of non-core assets

Concluded the sale of (i) the 50% stake in California Steel Industries; (ii) the Moatize coal mine and the Nacala Logistic Corridor; and (iii) the iron ore, manganese, and logistics assets of the Midwestern System.

Signed binding agreement for the sale of Companhia Siderúrgica do Pecém – CSP to ArcelorMittal. Closing March 9th, 2023.

Totaling 9 deals in 5 countries since 2019, eliminating expenditures of up to USD 2.0 billion per year.

#### Advancing the project pipeline

Approval of the Morowali project (formerly Bahodopi nickel project) in July. The project is expected to start-up in 2025. PTVI is slated to own 100% of the mine while the RKEF project with 73ktpy is a partnership between PTVI (49%) and two Chinese partners.

PTVI and Huayou signed binding agreements on the Pomalaa Nickel Project<sup>4</sup> to build an HPAL project associated with PTVI's Pomalaa nickel resources. The project is expected to start-up in 2025 with a production capacity of up to 120ktpy. Ford Motor Company signed a memorandum of understanding with PTVI and Huayou to join the Pomalaa nickel project to create a three-party relationship.

PTVI and Huayou signed a Heads of Agreement in September to build a 60ktpy HPAL project to process limonite ore from the Sorowako mine.

Approval of the Onca Puma 2nd furnace project with start-up expected in 2025, adding 12-15ktpy of nickel to our portfolio. The project leverages Onca Puma's existing infrastructure, and once complete, is expected to decrease unit production costs for the overall Onca Puma complex by 15%.

The Salobo III project successfully commenced at the end of 2022. The project is expected to add 30-40ktpy of copper production and it is expected to achieve full capacity in the fourth quarter of 2024.

VBME construction progressing in line with our revised forecast, at 81% physical completion by year end. The project is expected to achieve full capacity in the first quarter of 2024.

In Canada, beginning of the first phase of Copper Cliff Complex South Mine Project, which is expected to nearly double ore production at the Copper Cliff mine, adding around 10 ktpy of nickel and 13 ktpy of copper.

Northern System 240Mtpy<sup>2</sup> and Gelado projects commissioned in the fourth quarter of 2022, supporting a gradual increase of Northern System's iron ore production in 2023.

Reorganization of Energy Transition Materials operations in Brazil to combine copper and nickel assets into two entities

New structure for Vale's top leadership with the aim of accelerating the achievement of strategic objectives, supporting the development and longevity of the company's portfolio and strengthening Vale's second line of defense and risk management model

Read more in [Governance](#).

<sup>1</sup> Kilo-ton per year (ktpy).

<sup>2</sup> Million ton per year (Mtpy).

**Equity income (loss) by business segment**

(In USD millions)

	2021	2022
Iron Solutions	166	213
Energy Transition Materials	1	3
Others	327	30
<b>Total</b>	<b>494</b>	<b>246</b>

**Balance Sheet**

(In USD millions)

Current assets	15,526
Non-current assets	14,394
Fixed assets	56,974
<b>Total assets</b>	<b>86,894</b>
Current liabilities	13,891
Non-current liabilities	35,645
<b>Total liabilities</b>	<b>49,536</b>
Shareholders' equity	37,358
<b>Total liabilities and shareholders' equity</b>	<b>86,894</b>

# USD 7.9 billion

## Taxes paid to governments

**Results Center**

Access the complete 2022 financial statements [here](#). View Vale's global tax contributions in our annual Tax Transparency report.

**Value Generated and Distributed** GRI 201-1  
(In USD millions)

	North America, except Canada	Canada	South America, except Brazil	Brazil	Europe	Africa	Middle East	Asia	Oceania	Total
Revenues	-	2,151.4	2.4	4,296.6	33,691.7	-	(0.00)	3,697.5	-	<b>43,839.6</b>
<b>Direct Economic Value Generated</b>	<b>-</b>	<b>2,151.4</b>	<b>2.4</b>	<b>4,296.6</b>	<b>33,691.7</b>	<b>-</b>		<b>3,697.5</b>	<b>-</b>	<b>43,839.6</b>
Operational costs	-	2,964.0	7.4	11,725.6	6,010.8	-	302.9	1,201.5	0.2	<b>22,212.4</b>
Employee salaries and benefits	-	521.9	3.1	1,292.2	26.7	-	35.5	121	0.8	<b>2,001.2</b>
Research and Development	-	163.7	28.3	356.2	5.8	-	-	102	4.4	<b>660.4</b>
Payments to capital providers	515.2	242.3	-	6,583.7	46.7	-	-	-	-	<b>7,387.9</b>
Payments to government	24.3	(246)	3.4	7,995.7	(27)	22.3	13.6	144.6	0.7	<b>7,931.6</b>
Environmental Expenditures	-	33.17	0.99	712.27	0.79	-	2.28	1.32	16.03	<b>766.9</b>
Social Expenditures	-	6.06	0.18	1,590.01	1.15	-	1.91	5.97	4.06	<b>1,609.3</b>
<b>Distributed Economic Value</b>	<b>539.5</b>	<b>3,685.3</b>	<b>43.5</b>	<b>30,255.7</b>	<b>6,064.9</b>	<b>22.3</b>	<b>356.2</b>	<b>1,576.1</b>	<b>26.1</b>	<b>42,569.6</b>
<b>Accumulated Economic Value</b>	<b>(539.55)</b>	<b>(1,533.90)</b>	<b>(41.04)</b>	<b>(25,959.16)</b>	<b>27,626.8</b>	<b>(22.30)</b>	<b>(356.22)</b>	<b>2,121.3</b>	<b>(26.09)</b>	<b>1,269.8</b>



photo: Vale Archive

## Pará Structure

Vale has joined the Pará Structure, a program introduced by the Pará State Government to encourage companies in the mining sector to carry out infrastructure work in the state.

The total amount invested in the works can be deducted, up to the limit of 50%, from the amount owed by the company for the Tax on Control, Monitoring and Inspection of Activities of Research, Mining, Exploration and Use of Mining Resources (TFRM). The debt is the result of the retroactive collection of this tax, the constitutionality of which was evaluated by the courts for almost a decade.

The works selected by the company will be confirmed by the State Government and published in a public notice. The Pará Structure should contribute to accelerating the delivery and reducing the costs of improving Pará's infrastructure.

## Socio-environmental expenditure GRI 3-3 | 203-1

In 2022, Vale contributed USD 2.4 billion in socio-environmental and institutional expenditure, including those related to Brumadinho, which represented a 83% increase compared to 2021. Social expenditures totaled USD 1.6 billion, dedicated to social and institutional initiatives, of which 94% are from our own resources and 6% are investments from incentive-based funds. Environmental expenditures totaled USD 766.9 million, with main expenses in environmental liabilities, water resource management and atmospheric emissions abatement. Vale makes socioeconomic investments in the areas where we operate. In 2022, USD 140.5 million was earmarked in voluntary social, environmental and institutional expenditures funded through our own resources, including those related to Brumadinho. The main activities were in infrastructure and transport, social protection and health, among others.

## Incentive-based Funds

Vale also allocated USD 94.3 million in incentive-based funds through contributions to Rights Funds and support to civil society projects under four federal tax incentive laws: Childhood and Adolescence Fund; Senior Citizens Fund; Brazilian Sports Incentive Law; and Brazilian Culture Incentive Law.

Resources allocated to Funds are managed by separate Councils to strengthen municipal public policies benefiting children, teenagers and the elderly. The sporting projects sponsored by Vale benefited more than 111,000 people, mostly children and youth. The work of the Vale Cultural Institute served more than eight million people, generating around 5,300 permanent and temporary jobs.

**Vale allocated USD 94.3 million in incentive-based funds through contributions to Rights Funds and support 352 initiatives.**

## Business Context

### Production and sales highlights

Iron ore production totaled 308 million tons in 2022, down 2% from the previous year, mainly due to licensing delays at Serra Norte and jaspillite waste rock processing and operating performance at the S11D mine. These setbacks were offset by the continued ramp-up of production at Vargem Grande, higher production via dry processing at Brucutu, and increased purchases from third parties.

Pellet production totaled 32 million tons in 2022, up 1% year-on-year, with a better mix of direct reduction pellets (49% of total production versus 41% in 2021), leveraged by higher quality feed and taking advantage of higher market premiums.

Nickel production grew 6% in 2022 to 179kt, mainly explained by the stabilization of operations after the work stoppage at Sudbury in 2021, as well as the consistent strong performance at Onça Puma. This was partially offset by lower feed availability due to furnace refurbishment at PTVI (Indonesia) and delayed ramp-up at Voisey's Bay.

Copper production decreased by 15% to 253kt in 2022 due to extended maintenance at the Sossego mill during the first half of the year, and additional maintenance required at both Sossego

and Salobo. These events were partially offset by higher production in Canada due to the stabilization of the Sudbury mines and the recovery of copper from structures containing copper precipitates at Thompson, reducing waste as part of our approach aligned to circular mining.

**308 million tons**  
Iron production  
in 2022 - 2%

**32 million tons**  
Pellet production  
in 2022 + 1%

**179 kt**  
Nickel production  
in 2022 +6%

**253 kt**  
Copper production  
in 2022 -15%

## Indexes and ratings – Performance in ratings

Agency	Focus	Previous result	Current Result (result on the date of publication of this document)	
MSCI	ESG Generalist	CCC		B
Sustainalytics	ESG Generalist	39.1		35.3
ISS Quality Score	Governance	6		2
ISS Corporate Rating	ESG Generalist	C*		C+
Moody's	ESG Generalist	CIS-4 / Highly Negative		CIS-2 / Neutral to Low
Dow Jones SI	ESG Generalist	63		69
CA100+	Climate Change	2		1
CDP – Climate Change	Climate Change	A –		A –
CDP – Water Security	Water resources	B		B

\* Note from the first report issued in 2020.



photo: Leo L

## ESG Gaps

In 2022, we closed three gaps in our ESG action plan, namely:

- Expand the periodic supplier evaluation process to those mapped as critical and high-risk for Sustainability. **Read more in: [Responsible Sourcing.](#)**
- Conduct a global employee engagement survey. **Read more on the page [Our People.](#)**
- Disseminate information about mine closure planning, including community involvement process. **Read more in: [Mine closure and future use.](#)**

Another gap identified for 2022, the certification of the energy management system, has been de-prioritized after an internal reassessment. The search for efficient and sustainable energy management continues to be a priority for the Energy Efficiency Program, whose principles are based on the ISO 50001 standard.

As a result, PTVI, our nickel operation in Indonesia, obtained ISO 50001 certification in 2022.

This action plan was prepared in 2019 and revised in 2020, considering analysis of the main ESG assessments, aiming to align Vale's management with the best environmental, social and governance practices required by the market and society.

Of the total 63 gaps mapped, 57 have already been resolved, corresponding to 90% of the action plan.

**Read more [here.](#)**

The search for efficient and sustainable energy management continues to be a priority for the Energy Efficiency Program, whose principles are based on the ISO 50001 standard.



photo: Leo Lopes

# Participation in entities and associations GRI 2-28

Vale participates in the following entities and associations. Many abbreviations refer to Portuguese acronyms.

- ABEC BRASIL (Brazilian Association of Scientific Editors), via ITV
- Brazilian Society of Sciences (ABC)
- Citizenship Action (Ação da Cidadania)
- American Chamber of Commerce for Brazil (AMCHAM RJ)
- Aspen Network of Development Entrepreneurs (ANDE), via the Vale Fund
- Brazilian Metallurgy, Materials and Mining Association (ABM)
- Central Japan–Brazilian Association in Japan (ACNB)
- Brazilian Foreign Trade Association (AEB)
- Brazilian Association of Port Terminals (ATP)
- National Association of Rail Carriers (ANTF)
- Brazil–Canada Chamber of Commerce
- Business at OECD (BIAC)
- Business for Social Responsibility (BSR)
- Brazilian Chamber of Commerce in Japan (CCBJ)
- France–Brazil Chamber of Commerce
- CNRT Nickel and its Environment (Centre National de Recherche Technologique Nickel et Son Environnement /CNRT Nickel)
- Brazilian Center for International Relations (CEBRI)
- Reference Centre for Integral Education, via the Vale Foundation
- Childhood Brasil
- Brazil Climate Coalition Forests and Agricultures
- Covid Radar Collective
- Columbia Center on Sustainable Investment (CCSI)
- Brazilian National Confederation of Industry (CNI)
- Brazilian Corporate Volunteer Council
- China–Brazil Business Council (CEBC)
- Brazilian Business Council for Sustainable Development (CEBDS)
- Brazil–Japan Business Council (CEBJ)
- BRICS Business Council (CEBRICS)
- European Association of Metals (Eurometaux)
- Extractive Industries Transparency Initiative (EITI)
- Industry Federation of the State of Minas Gerais (FIEMG)
- Industry Federation of the State of Rio de Janeiro (FIRJAN)
- National Forum of Pro-rectors for Research and Postgraduation (FOPROP), via ITV
- Foundation for Foreign Trade Studies Centre (Fundação Centro de Estudos do Comércio Exterior / Funcex)
- Global Business Initiative on Human Rights (GBI)
- Group of Corporate Institutes and Foundations (GIFE), via the Vale Foundation
- Institute for the National Pact to Eradicate Slave Labour (InPACTO)
- Instituto Acende Brasil
- Brazilian Mining Institute (IBRAM)
- International Council of Museums Brazil (ICOM)
- International Council on Mining & Metals (ICMM)
- Latimacto – Latin American Venture Philanthropy Network, via the Vale Fund
- Mining Hub
- National Pact for Early Childhood, via the Vale Foundation
- Partnership Platform for the Amazon (PPA)
- National Education and Research Network (RNP), via ITV
- Sustainable Development Solutions Network (SDSN)
- Task Force on Climate-related Financial Disclosures (TCFD)
- Taskforce on Nature-related Financial Disclosures (TNFD)
- The Cobalt Development Institute
- The Indonesian Mining Association (IMA)
- The Mining Association of Canada (MAC)
- The Nickel Institute
- All for Education, via the Vale Foundation
- Voluntary Principles on Security and Human Rights
- Wise Group
- Women in Mining Brazil
- Women in Mining and Resources Singapore (WIMAR SG)
- World Business Council for Sustainable Development (WBCSD)
- World Economic Forum (WEF)



## Peer Reviewers

Eighty years ago, societal and market rules operated differently. The responsibility of capital over impacts of economic activity was not up for debate and climate change was not part of the plot of dystopian fiction, much less considered in scientific journals. On its 80th anniversary emblematic publication of its Integrated Report, Vale inhabits a world that could not be more different than the one in 1942, when it was founded.

Climate change is an undeniable reality, social inequality is no longer tolerated as a natural consequence of capitalism, and structural racism and misogyny are struggles that everyone must engage in. As investors, we watch with special attention the ability of companies to capture the zeitgeist of the new normal in 2023 as they seek to translate it into concrete actions and bold, accountable plans. From the fiduciary exercise of monitoring invested assets, Vale received special attention because of its scale, the impact of its industry, and its past controversies. In the year Vale was founded, the world of 1942 experienced a divide between the world pre and post WWII, the Brumadinho and Mariana accidents were milestones delineating our responsibility as investors over the management of risks and impacts by companies in which we allocate our capital.

### Vale's Social and Environmental Ambition

We experience serious structural deficiencies in Brazil, and companies that operate in the country have the responsibility to address historically inequalities in order to earn their social license to operate. In this context, we observe distinguish Vale's social goal to lift 500 thousand people out of extreme poverty, and its internal diversity, equity and inclusion goals to increase the participation of women in the workforce and in leadership positions.

By establishing voluntary targets for increasing the representativeness of minority groups, we highlight the target of achieving 40% of black leadership in Brazil by 2026. Another highlight that promotes a more inclusive society is the benefit offered to LGBTQIAP+ professionals of coverage for sexual reassignment surgeries. In a country like ours, a recurrent record-breaker in trans homicide, initiatives like this are transformational and show Vale's true support for the cause. However, we strongly recommend that the scope of the diversity goals be broadened to include Board of Director composition.

Returning to the company's most controversial issue – the accidents in Mariana and Brumadinho – we believe that the challenge is more than a purely physical feat, with the urgent need to complete reparations to families and communities affected by these disasters that should never have occurred, the decharacterization of upstream dams, and the reduction dam emergency levels. The most challenging of the obstacles to be overcome by Vale will be to rebuild the perception of the affected communities in relation to Vale, as well as of investors and national and international public opinion. In order for these relationships not to be further deteriorated, it is essential that the company complies with the delivery of housing and full compensation, anticipating the schedule whenever possible especially in cases with worrisome delays. We hope that the obsession, outlined as one of the company's values, be converted into increased celerity not only in the reparation schedules, but also in the decharacterization plan, bringing forward the deadline currently set for 2035.

In the environmental sphere, the goal of recovering and protecting 500,000 hectares of forests demonstrates Vale's commitment to leverage positive results beyond its fence lines. Helping the company to be a vehicle for value generation, not only for greenhouse gas mitigation, but also for fostering economically, sustainable socio-environmental impact. The company's constant technological development and commitment to decarbonizing its value chains with customers downstream are positive indications that the company has assimilated its role in the global green transition and understands this to be a relevant, competitive factor for its business.

Finally, we urge Vale to deepen discussions regarding its presence in the Amazon biome operating close to sensitive territories, providing more clear guidance on adopted positions for its operations that may negatively affect the environment, greater detail of engagement actions and actions undertaken to protect traditional peoples directly and indirectly affected by the company's activity.

### What do we expect for its 100th anniversary

Celebrating a century of life is an achievement especially in an economy as young and volatile as Brazil's, but it's a milestone that Vale could reach in two decades. However, the next 20 years will demand more agility and a change of attitude that was not required by the previous eight decades of its existence. The speed of technological transformation in the world, the climate urgency and the

increase in global awareness about planetary limits and social foundations are foundations for a desirable economy and will pose challenges urging companies born prior to green capitalism to adapt.

Vale resides in a complex ambivalence of having its main economic activity based on a sector with a high socio–environmental impact, but also highly necessary for making the transition to a green economy possible. This duality will demand coordination of efforts, technologies, policies and organizational culture above what is expected from other industries, whilst preserving a transition carried out with the least possible impact on current and future societies and on the ecosystems directly or indirectly affected by Vale’s activities.

### What do we expect in the first centenary

Celebrating a century of life is a feat for companies in an economy as young and volatile as Brazil’s, but this is the destiny that Vale could reach in two decades. The next 20 years will, however, be much more agile and demand a change of attitude than the previous eight decades of its existence. The speed of technological transformation in the world, the climate urgency and the increase in global awareness about planetary limits and social foundations as protections of a desirable economy will pose challenges for the adaptation of companies born in the cycle prior to that of green capitalism.

What will Vale’s 2043 Integrated Report look like? Possibly it will be the one that investors and the company build together. The fiduciary duty presupposes the sharing of responsibilities between the financial market and the real economy, including the construction of futures for companies such as Vale and its representativeness for the global green economy. We hope that Vale will be able to overcome the challenges that are still present in the company today and that should be prioritized in the coming years: the recovery of trust from society and the financial market regarding the company’s ability to responsibly manage its operations, the capacity to serve its customers with adequate solutions to the demands of low carbon and high socio–environmental efficiency and the transition from a more isolated culture to an open organizational culture, connected to the stakeholders in its entirety.

#### José Pugas

Partner and Head of Sustainable Investment and Engagement  
at JGP Asset Management

April 2023

## Peer Reviewers

R&A Strategic Communications was asked by Vale to support the company in by reviewing: the English translation of the report to ensure the understanding and applicability of language; and as a ‘peer’, tone, substance and structure of the Integrated Report.

In our review we considered Vale’s 2022 Integrated Annual Report against the guiding principles of the Integrated Reporting Framework, now part of the IFRS Foundation, as well as the principles of the GRI Reporting Framework (GRI Standards).

Our foremost observation is that Vale has sought to develop a report that is both comprehensive and balanced and reports on the company’s performance today, as well as its future intentions. The report is concise and accessible.

That Vale has adopted integrated reporting is a clear reflection of its desire to account for its value creation journey and should be commended. In its adoption of double materiality Vale accounts to society on a broad range of environmental, social and governance (ESG) impacts.

The report’s structure is aligned with the company’s strategy and demonstrates the integration of ESG in the business.

The role and perceptions of the company’s primary stakeholders have been considered in the materiality assessment: why and how engagements took place, stakeholders’ main concerns are documented, and there is a consistent reference to stakeholders’ interests and expectations throughout the report.

A great deal of focus is placed on the company’s accountability for and actions following the tailings dam failures at Bento Rodrigues and Brumadinho. This reporting is strikingly reflective and compassionate, with a focus on reparations to the people and communities affected by these tragedies, the environmental ‘clean up’, and efforts by the company to instill best practice risk management and governance in tailings management, to ensure that these events are never repeated.

Also notable is the reporting on Vale’s approach to climate change, and how the opportunities offered by the transition to a low carbon business will ensure its long-term sustainability. The

company recognizes that its operations are located in areas of high biodiversity value, and that it needs to earn and maintain its social license to operate.

Finally, the review of certain reporting parameters by an independent auditor points to the reliability of the information and data.

Our assessment is that Vale has broadly met the principles of both integrated and sustainability reporting.

### Considerations for the future

Our recommendations for future reporting are:

- Greater focus (as the primary report to shareholders/stakeholders) on what Vale does, why it does it, how it does it, and who is driving what it does, as well as the context in which it operates. This would be well supported by the inclusion of a value-added statement.
- Vale provides a clear picture up front of the scale and footprint of the business and its value chain, in addition to a detailed business model that clearly demonstrates the value creation journey, including inputs, outputs and impacts. Setting the scene up front helps to illustrate the connectivity of information, which could be further supported by clear sign-posting throughout the report to the capitals, material issues and the UN Sustainable Development Goals.
- Demonstrating the external operating environment faced by the company and how the company has responded – including an assessment of primary markets and products.
- Elaborating on Board composition (including committees), member roles, accountabilities and executive remuneration, as well as some of the key decisions taken by the board pertaining to value creation, preservation and erosion.
- Including more details about executive leadership – who they are, what they do, their competencies and how they fulfill their roles.
- In addition to the business model, elaborating on all of the capitals throughout this report. This report intentionally concentrates on human capital, social and relationship capital and

natural capital, but as an integrated report we believe that matters relating to the financial, manufactured and intellectual capitals should be incorporated to ensure the report is complete .

- Also, indicating of the trade-offs made between the capitals.
- The materiality process appears to be thorough and valuable. It would help to include more detail on each issue, and how and why it presents a risk or opportunity throughout the report with some level of prioritization of material matters as the basis of its approach .
- Further disclosure regarding the risk management process and principal risks and opportunities would add value.
- The company's approach and contribution to the UN SDGs could be better highlighted

### Other observations:

- Vale has an opportunity to provide more information on all the jurisdictions in which it operates, most notably Canada and Indonesia.
- While the company's focus on its decarbonization strategy is clear, we would recommend additional focus on how the company is addressing climate change resilience and adaptation, including for communities.
- The report would benefit from a clearer identification of targets and goals and performance against them, particularly a demonstration of trends through the addition of graphs.

**Charmane Russell and Marika Muller**  
Principals at R&A Strategic Communications

April 2023

# Assurance report GRI 2-5

(A free translation of the original in Portuguese)

Independent auditor's limited assurance report on the non-financial information included in the 2022 Integrated Report of Vale S.A.

To the Board of Directors and Stockholders

Vale S.A.  
Rio de Janeiro - RJ

## Introduction

We have been engaged by Vale S.A. ("Company" or "Vale") to present our limited assurance report on the non-financial information included in the 2022 Integrated Report of Vale and certain selected information from the attachment Databook ESG 2022 (hereinafter collectively referred to as "2022 Integrated Report") for the year ended December 31, 2022.

Our limited assurance does not cover prior-period information, or any other information disclosed together with the 2022 Integrated Report, including any images, audio files or videos.

## Responsibility of Vale's management

The management of Vale is responsible for:

- selecting or establishing adequate criteria for the preparation and presentation of the information included in the 2022 Integrated Report;
- preparing the information in accordance with the criteria and guidelines of the Global Reporting Initiative (GRI - Standards), with the basis of preparation developed by the Company, and with Guidance CPC 09 - Integrated Reporting, issued by the Federal Accounting Council (CFC), equivalent to the Basic Conceptual Framework for Integrated Reporting, prepared by the International Integrated Reporting Council (IIRC); and
- designing, implementing and maintaining internal control over the significant information for the preparation of the information included in the 2022 Integrated Report, which is free from material misstatement, whether due to fraud or error.

## Independent auditor's responsibility

Our responsibility is to express a conclusion on the non-financial information included in the 2022 Integrated Report and certain selected information from the attachment Databook ESG, based on our limited assurance engagement carried out in accordance with the Technical Communication CTO 01, "Issuance of an Assurance Report related to Sustainability and Social Responsibility", issued by the Federal Accounting Council (CFC), based on the Brazilian standard NBC TO 3000, "Assurance Engagements Other than Audit and Review", also issued by the CFC, which is equivalent to the international standard ISAE 3000, "Assurance engagements other than audits or reviews of historical financial information", issued by the International Auditing and Assurance Standards Board (IAASB). Those standards require that we comply with ethical requirements, including independence requirements, and other responsibilities of these standards, including those regarding the application of the Brazilian Quality Control Standard (NBC PA 01) and, therefore, the maintenance of a comprehensive quality control system, including documented policies and procedures on the compliance with ethical requirements, professional standards and relevant legal and regulatory requirements.

Moreover, the aforementioned standards require that the work be planned and performed to obtain limited assurance that the non-financial information included in the 2022 Integrated Report, taken as a whole, is free from material misstatement.

A limited assurance engagement conducted in accordance with the Brazilian standard NBC TO 3000 and ISAE 3000 mainly consists of making inquiries of management and other professionals of Vale involved in the preparation of the information, as well as applying analytical procedures to obtain evidence that allows us to issue a limited assurance conclusion on the information, taken as a whole. A limited assurance engagement also requires the performance of additional procedures when the independent auditor becomes aware of matters that lead him to believe that the information disclosed in the Integrated Report taken as a whole might present significant misstatements.

The procedures selected are based on our understanding of the aspects related to the compilation, materiality, and presentation of the information included in the 2022 Integrated Report, other circumstances of the engagement and our analysis of the activities and processes associated with the significant information disclosed in the 2022 Integrated Report in which significant misstatements might exist. The procedures comprised, among others:

- (a) **planning the work, taking into consideration the materiality and the volume of quantitative and qualitative information and the operating and internal control systems that were used to prepare the information included in the 2022 Integrated Report;**
- (b) **understanding the calculation methodology and the procedures adopted for the compilation of indicators through inquiries of the managers responsible for the preparation of the information;**
- (c) **applying analytical procedures to quantitative information and making inquiries regarding the qualitative information and its correlation with the indicators disclosed in the 2022 Integrated Report; and**
- (d) **when non-financial data relate to financial indicators, comparing these indicators with the financial statements and/or accounting records.**

The limited assurance engagement also included the analysis of the compliance with the guidelines and criteria 1) of the Global Reporting Initiative (GRI – Standards); 2) the provisions established in the basis of preparation developed by the Company; 3) the principles for the Integrated Reporting, pursuant to Guidance CPC 09 – Integrated Reporting, related to the Basic Conceptual Framework for Integrated Reporting, prepared by the International Integrated Reporting Council (IIRC) applicable in the preparation of the information included in the 2022 Integrated Report.

We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our limited assurance conclusion.

### Scope and limitations

The procedures applied in a limited assurance engagement vary in nature and timing, and are less detailed than those applied in a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the level that would be obtained in a reasonable assurance engagement. If we had performed a reasonable assurance engagement, we might have identified other matters and possible misstatements in the information included in the 2022 Integrated Report. Therefore, we do not express an opinion on this information.

Non-financial data are subject to more inherent limitations than financial data, due to the nature and diversity of the methods used to determine, calculate and estimate these data. Qualitative interpretations of the relevance, materiality, and accuracy of the data are subject to individual assumptions and judgments. Furthermore, we did not consider in our engagement the data reported for prior periods, nor future projections and goals.

The preparation and presentation of non-financial information and indicators followed the definitions of the basis of preparation developed by the Company and the guidelines of the Global Reporting Initiative (GRI – Standards) and, therefore, the information included in the 2022 Integrated Report does not the objective of providing assurance with regard to the compliance with social, economic, environmental or engineering laws and regulations. However, the aforementioned standards establish the presentation and disclosure of possible cases of non-compliance with such regulations when sanctions or significant fines are applied. Our assurance report should be read and understood in this context, inherent to the criteria selected and previously mentioned in this paragraph.

### Conclusion

Based on the procedures described above and on evidence obtained, no matter has come to our attention that causes us to believe that the non-financial information included in the Integrated Report for the year ended December 31, 2022 of Vale S.A. has not been prepared, in all material respects, in accordance with the criteria and guidelines of the Global Reporting Initiative (GRI) (GRI-Standards), with the basis of preparation developed by the Company, and with the Guidance CPC 09 – Integrated Reporting

São Paulo, April 20, 2023

**PricewaterhouseCoopers**  
**Audidores Independentes Ltda.**  
 CRC 2SP000160/O-5

**Maurício Colombari**  
 Contador CRC 1SP195838/O-3

# GRI content index



CONTENT INDEX  
ESSENTIALS SERVICE

2023

**Statement of use** Vale has reported in accordance with the GRI Standards for the period from January 1 to December 31, 2022.

**GRI1 used** GRI1: Foundation 2021

**For the Content Index Essentials Service**, GRI Services reviewed that the GRI content index is clearly presented, in a manner consistent with the Standards, and that the references for disclosures 2-1 to 2-5, 3-1 and 3-2 are aligned with the appropriate sections in the body of the report. The service was performed on the Portuguese version of the report.

GRI Standard	Disclosure	Page number(s) and/or url(s)page number(s) and/or url and/or direct answers	Material / Non-material	Omission	
				Requirement(s) omitted	Reason Explanation
<b>General disclosures</b>					
	2-1 Organizational details	Pages 12 and 13.	Mandatory		
	2-2 Entities included in the organization's sustainability reporting	Page 7. The financial statements can be checked at <a href="#">link</a> . All entities controlled by vale are covered in the integrated reporting.	Mandatory		
	2-3 Reporting period, frequency and contact point	Annual. Further information can be found on page 7.	Mandatory		
	2-4 Restatements of information	Pages 17, 23, 28, 30, 36, 54, 56, 57 and 62.	Mandatory		
	2-5 External assurance	Pages 7, 84. Vale's external verification process is required by its membership of the International Council on Mining and Metals (ICMM).	Mandatory		
<b>GRI 2: General Disclosures 2021</b>	2-6 Activities, value chain and other business relationships	Pages 12, 13, 64. Further information can be found in the 2022 Reference Form - section item 6. Issuer's history / 6.3 - Brief history and 7.3 Production / sales / markets and in <a href="#">Form 20F</a> - Section "Significant Changes in our business".	Mandatory		
	2-7 Employees	Page 23. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Mandatory		
	2-8 Workers who are not employees	Page 23. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Mandatory		
	2-9 Governance structure and composition	Pages 69, 70, 71. Further information can be found in <a href="#">Board of Directors' Internal Regulations</a> .	Mandatory		
	2-10 Nomination and selection of the highest governance body	Pages 70, 71. Further information can be found in the <a href="#">Form 20F</a> 2022 - section: Management and employees.	Mandatory		
	2-11 Chair of the highest governance body	Page 70. The CEO does not accumulate the position of chairman of the board of directors.	Mandatory		

GRI Standard	Disclosure	Page number(s) and/or url(s)page number(s) and/or url and/or direct answers	Material / Non-material	Omission	
				Requirement(s) omitted"	Reason Explanation
<b>General disclosures</b>					
<b>GRI 2: General Disclosures 2021</b>	2-12 Role of the highest governance body in overseeing the management of impacts	Pages 7, 8, 19, 31, 70 and 71. Further information can be found in <a href="#">2023 General Meetings of Shareholders</a> and <a href="#">Internal Regulations of the Sustainability Committee</a> - Chapter V - Meetings.	Mandatory		
	2-13 Delegation of responsibility for managing impacts	Pages 69, 70 and 71.	Mandatory		
	2-14 Role of the highest governance body in sustainability reporting	Pages 7, 70.	Mandatory		
	2-15 Conflicts of interest	Page 75. Further information can be found in <a href="#">Related Parties Transactions and Conflicts of Interest Policy</a> .	Mandatory		
	2-16 Communication of critical concerns	Pages 31, 41, 73. Further information can be found in the <a href="#">Form 20F</a> 2022 and in the 2022 Reference Form, both on section: "Risk Factors".	Mandatory		
	2-17 Collective knowledge of the highest governance body	Page 70. Further information can be found in <a href="#">2023 General Meetings of Shareholders</a> .	Mandatory		
	2-18 Evaluation of the performance of the highest governance body	Page 70. Additional information regarding the content is disclosed in the Company's annual Reference Form and should be consulted in the chapter "Administrative Structure", until the 2022 document and as of the 2023 document in the chapter "General Assembly and Management".	Mandatory		
	2-19 Remuneration policies	Page 71. Further information can be found in the 2022 Reference Form - Item "13. Management compensation / 13.1 - Compensation policy and remuneration policy/practice".	Mandatory		
	2-20 Process to determine remuneration	Page 71. Additional information regarding the content is disclosed in the Company's annual Reference Form under the chapters Management Compensation and Compensation Policy/Practice.	Mandatory		

GRI Standard	Disclosure	Page number(s) and/or url(s)	Material / Non-material	Omission		
				Requirement(s) omitted"	Reason	Explanation
<b>General disclosures</b>						
	2-21 Annual total compensation ratio	Omitted	Mandatory	Vale does not disclose the annual total compensation of the organization's highest-paid individual.	Confidentiality constraints	Information subject to specific confidential restrictions: vale does not disclose the annual total compensation of the organization's highest-paid individual due to the sensitivity of the information and for confidentiality reasons. The confidential restrictions refer specifically to the sensitivity related to salary data that can personally identify and expose company employees. We are in a process of gradual improvement in order to disclose this information to the market .
	2-22 Statement on sustainable development strategy	Pages 4, 5 and 17.	Mandatory			
<b>GRI 2: General Disclosures 2021</b>	2-23 Policy commitments	Pages 17, 18, 22, 31, 44, 50. Commitments arising from corporate policies are approved as per Governance by the Company's Board of Directors. For information about approval levels and senior management involvement regarding Vale Policies, please access <a href="#">here</a> .	Mandatory			
	2-24 Embedding policy commitments	Pages 17, 22 and 25. For information on how the company delegates and implements its commitments, please refer to the <a href="#">Authority Policy</a> (Corporate Policy). For information about the integration of commitments, their implementation in the company's strategies and the provision of training related to the theme, see the <a href="#">Drafting and Publication of Policies</a> .	Mandatory			
	2-25 Processes to remediate negative impacts	Pages 8, 19, 31, 41 and 73.	Mandatory			
	2-26 Mechanisms for seeking advice and raising concerns	Page 73.	Mandatory			
	2-27 Compliance with laws and regulations	Page 74.	Mandatory			
	2-28 Membership associations	Page 80.	Mandatory			
	2-29 Approach to stakeholder engagement	Page 19.	Mandatory			
	2-30 Collective bargaining agreements	Page 24.	Mandatory			



GRI Standard	Disclosure	Page number(s) and/or url(s)page number(s) and/or url and/or direct answers	Material / Non-material	Omission	
				Requirement(s) omitted"	Reason Explanation
<b>Material topics</b>					
<b>GRI 3: Material Topics 2021</b>	3-1 Process to determine material topics	Page 8. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory		
<b>GRI 3: Material Topics 2021</b>	3-2 List of material topics	Page 8. There have been no significant changes in the material topics since the last integrated report.	Mandatory		
<b>Dams</b>					
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 32. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory		
	MM3 Total amounts of overburden, rock, tailings, and sludges and their associated risks	Pages 32, 67. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
<b>Biodiversity</b>					
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 49. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory		
<b>GRI 304: Biodiversity 2016</b>	304-1 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	Page 49. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	304-2 Significant impacts of activities, products and services on biodiversity	Page 49. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	304-3 Habitats protected or restored	Pages 49, 50. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	304-4 IUCN Red List species and national conservation list species with habitats in areas affected by operations	Page 50. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
<b>Mining and Metals Sector Disclosures</b>	MM1 Amount of land (owned or leased, and managed for production activities or extractive use) disturbed or rehabilitated	Page 49. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	MM2 The number and percentage of total sites identified as requiring biodiversity management plans according to stated criteria, and the number (percentage) of those sites with plans in place	Page 50. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		

GRI Standard	Disclosure	Page number(s) and/or url(s)page number(s) and/or url and/or direct answers	Material / Non-material	Omission		
				Requirement(s) omitted"	Reason	Explanation
<b>Material topics</b>						
<b>Ecoefficiency</b>						
<b>GRI 3: Material Topics</b>	3-3 Management of material topics	Page 52. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory			
	303-1 Interactions with water as a shared resource	Page 52 e 53. <a href="#">ESG Databook</a> : "environment data" tab.	Material			
	303-2 Management of water discharge-related impacts	Page 52. <a href="#">ESG Databook</a> : "environment data" tab.	Material			
	303-3 Water withdrawal	Page 53. <a href="#">ESG Databook</a> : "environment data" tab.	Material			
<b>GRI 303: Water and Effluents 2018</b>	303-4 Water discharge	Page 53. <a href="#">ESG Databook</a> : "environment data" tab.	Material	303-4-d-iii	Information unavailable/incomplete.	Note: We follow the regulations in place, maintaining our controls, the violations are investigated and reported to the responsible authorities, and the appropriate action plans are established. However, the definitions of "non-conformities" are under discussion, making it impossible to make any statements.
	303-5 Water consumption	Page 53. <a href="#">ESG Databook</a> : "environment data"" tab. There were no changes in water storage."	Material			
<b>GRI 305: Emissions 2016</b>	305-6 Emissions of ozone-depleting substances (ODS)	<a href="#">ESG Databook</a> : "environment data" tab.	Material			
	305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	Page 54. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material			
<b>Mine closure and future use</b>						
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 48. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory			
<b>GRI G4: Mining and Metals Sector Disclosures</b>	MM10 Number and percentage of operations with closure plans	Page 48. <a href="#">ESG Databook</a> : "environment data" tab.	Material			
<b>Climate change</b>						
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 55. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory			

GRI Standard	Disclosure	Page number(s) and/or url(s)page number(s) and/or url and/or direct answers	Material / Non-material	Omission	
				Requirement(s) omitted"	Reason Explanation
<b>Material topics</b>					
<b>GRI 201: Economic Performance 2016</b>	201-2 Financial implications and other risks and opportunities due to climate change	Page 55 and 62. We follow the regulations in force, maintain our controls and the deviations are investigated, reported to the responsible bodies and the appropriate action plans are established. However, the definitions of "non-conformities" are under discussion, making it impossible to make any statement.	Material		
<b>GRI 302: Energy 2016</b>	302-1 Energy consumption within the organization	Pages 13, 57. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	302-2 Energy consumption outside of the organization	<a href="#">ESG Databook</a> : "environment data" tab.	Material		
	302-3 Energy intensity	Page 57. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	302-4 Reduction of energy consumption	Page 57. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
<b>GRI 305: Emissions 2016</b>	305-1 Direct (Scope 1) GHG emissions	Page 56. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	305-2 Energy indirect (Scope 2) GHG emissions	Page 56. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	305-3 Other indirect (Scope 3) GHG emissions	Page 62. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	305-4 GHG emissions intensity	Page 57. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
	305-5 Reduction of GHG emissions	Page 56. More information can be found in the "environment data" tab of the <a href="#">ESG Databook</a> .	Material		
<b>Governance and compliance</b>					
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 69. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory		
<b>GRI 201: Economic Performance 2016</b>	201-1 Direct economic value generated and distributed	Page 77. More information can be found in the "economic data" tab of the <a href="#">ESG Databook</a> .	Material		
	201-4 Financial assistance received from government	<a href="#">ESG Databook</a> : "economic data" tab.	Material		
<b>GRI 205: Anti-Corruption 2016</b>	205-1 Operations assessed for risks related to corruption	<a href="#">ESG Databook</a> : "economic data" tab.	Material		
	205-2 Communication and training about anti-corruption policies and procedures	Page 72. More information can be found in the "economic data" tab of the <a href="#">ESG Databook</a> .	Material		
	205-3 Confirmed incidents of corruption and actions taken	<a href="#">ESG Databook</a> : "economic data" tab.	Material		

GRI Standard	Disclosure	Page number(s) and/or url(s)	Material / Non-material	Omission	
				Requirement(s) omitted"	Reason
<b>Material topics</b>					
<b>GRI 206: Anti-competitive Behavior 2016</b>	206-1 Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	Page 75.	Material		
<b>Human rights</b>					
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 22. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory		
<b>GRI 408: Child Labor 2016</b>	408-1 Operations and suppliers at significant risk for incidents of child labor	Page 23. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		
<b>GRI 409: Forced or Compulsory Labor 2016</b>	409-1 Operations and suppliers at significant risk for incidents of forced or compulsory labor	Page 23. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		
<b>GRI 410: Security Practices 2016</b>	410-1 Security personnel trained in human rights policies or procedures	Page 22. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		
<b>People</b>					
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Pages 23, 24. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory		
<b>GRI 201: Economic Performance 2016</b>	201-3 Defined benefit plan obligations and other retirement plans	<a href="#">ESG Databook</a> : "economic data" tab. Further information can be found in the <a href="#">Form 20F</a> 2022 – section: Employees.	Material		
<b>GRI 401: Employment 2016</b>	401-1 New employee hires and employee turnover	Page 23. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		
	401-2 Benefits provided to full-time employees that are not provided to temporary or part-time employees	Page 24. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		
	401-3 Parental leave	<a href="#">ESG Databook</a> : "social data" tab.	Material		
<b>GRI 404: Training and Education 2016</b>	404-1 Average hours of training per year per employee	Page 25. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		
	404-2 Programs for upgrading employee skills and transition assistance programs	Page 25. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		
	404-3 Percentage of employees receiving regular performance and career development reviews	<a href="#">ESG Databook</a> : "social data" tab.	Material		
<b>GRI 405: Diversity and Equal Opportunity 2016</b>	405-1 Diversity of governance bodies and employees	Page 27. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material		

GRI Standard	Disclosure	Page number(s) and/or url(s)	Material / Non-material	Omission		
				Requirement(s) omitted"	Reason	Explanation
<b>Material topics</b>						
<b>GRI 405: Diversity and Equal Opportunity 2016</b>	405-2 Ratio of basic salary and remuneration of women to men	Page 24. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material	405-2-a 405-2-b	Information unavailable/incomplete.	The information disclosed about the ratio between the base salaries and remuneration received by women and men does not use "significant operational units" as a criterion, because the employees of all the company's units are considered.
<b>GRI 406: Non-Discrimination 2016</b>	406-1 Incidents of discrimination and corrective actions taken	Page 73. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material			
<b>GRI 407: Freedom of Association and Collective Bargaining 2016</b>	407-1 Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk	Page 24. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material			
<b>Health and safety</b>						
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 28. Further information can be found at <a href="#">Vale's ESG Portal</a> .	Mandatory			
<b>GRI 403: Occupational Health and Safety 2018</b>	403-1 Occupational health and safety management system	Page 28. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material			
	403-2 Hazard identification, risk assessment, and incident investigation	Page 31. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material			
	403-3 Occupational health services	<a href="#">ESG Databook</a> : "social data" tab.	Material			
	403-4 Worker participation, consultation, and communication on occupational health and safety	<a href="#">ESG Databook</a> : "social data" tab.	Material			
	403-5 Worker training on occupational health and safety	<a href="#">ESG Databook</a> : "social data" tab.	Material			
	403-6 Promotion of worker health	<a href="#">ESG Databook</a> : "social data" tab.	Material			
	403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	<a href="#">ESG Databook</a> : "social data" tab.	Material			
	403-8 Workers covered by an occupational health and safety management system	<a href="#">ESG Databook</a> : "social data" tab.	Material			
	403-9 Work-related injuries	Page 28. More information can be found in the "social data" tab of the <a href="#">ESG Databook</a> .	Material			

GRI Standard	Disclosure	Page number(s) and/or url(s)	Material / Non-material	Omission		
				Requirement(s) omitted	Reason	Explanation
<b>Material topics</b>						
<b>GRI 403: Occupational Health and Safety 2018</b>	403-10 Work-related ill health	<a href="#">ESG Databook</a> : “social data” tab.	Material	403-10-b	Information unavailable/incomplete.	The data reported here deals only with own employees, health statistics on third-party employees are managed by the contracting company.
<b>Local communities</b>						
<b>GRI 3: Material Topics 2021</b>	3-3 Management of material topics	Page 40. Further information can be found at <a href="#">Vale’s ESG Portal</a> .	Mandatory			
<b>GRI 202: Market Presence 2016</b>	202-1 Ratios of standard entry level wage by gender compared to local minimum wage	Page 24. More information can be found in the “economic data” tab of the <a href="#">ESG Databook</a> .	Non material			
<b>GRI 203: Indirect Economic Impacts 2016</b>	203-1 Infrastructure investments and services supported	Page 78. More information can be found in the “economic data” tab of the <a href="#">ESG Databook</a> .	Material			
	203-2 Significant indirect economic impacts	<a href="#">ESG Databook</a> : “economic data” tab.	Material			
<b>GRI 411: Rights of Indigenous Peoples 2016</b>	411-1 Incidents of violations involving rights of indigenous peoples	In the year 2022, a case of violation of indigenous peoples’ rights was registered in Brazil. More information can be found in the “social data” tab of the <a href="#">ESG Databook</a> .	Material			
<b>GRI 413: Local Communities 2016</b>	413-1 Operations with local community engagement, impact assessments, and development programs	Page 40. More information can be found in the “social data” tab of the <a href="#">ESG Databook</a> .	Material			
	413-2 Operations with significant actual and potential negative impacts on local communities	Page 40. More information can be found in the “social data” tab of the <a href="#">ESG Databook</a> .	Material			
<b>GRI G4: Mining and Metals Sector Disclosures</b>	MM5 Total number of operations taking place in or adjacent to indigenous peoples’ territories, and number and percentage of operations or sites where there are formal agreements with indigenous peoples’ communities	Page 41. More information can be found in the “social data” tab of the <a href="#">ESG Databook</a> .	Material			
	MM6 Number and description of significant disputes relating to land use, customary rights of local communities and indigenous peoples	Page 43. More information can be found in the “social data” tab of the <a href="#">ESG Databook</a> .	Material			
	MM7 The extent to which grievance mechanisms were used to resolve disputes relating to land use, customary rights of local communities and indigenous peoples, and the outcomes	Page 43. More information can be found in the “social data” tab of the <a href="#">ESG Databook</a> .	Material			
	MM9 Sites where resettlements took place, the number of households resettled in each, and how their livelihoods were affected in the process	Pages 36, 42 and 43. More information can be found in the “social data” tab of the <a href="#">ESG Databook</a> .	Material			

# Credits

## Realization

Executive Vice President of Sustainability

## ESG Consulting, Content and Design editorial and integrated graphics

Juntos | Approach Comunicação – approach.com.br

## Materiality

usina82

## Technical support to data collection GRI, SASB, WEF and ICMM indicators

EY

## Limited assurance

PwC

## Photographs

Vale Image Bank and collection (photo credits)

Cover: In the photo, from left to right, green iron ore briquettes (product with higher added value for decarbonization);

Ademilda Costa, a babassu coconut extractivist in Vitória do Mearim, Maranhão; Carajás National Forest, in Pará, one of the preservation areas contributing to Vale's forestry goal; and employees Bruna Eduarda Ribeiro Brito and Luciano Lopes de Grázia, at Viga mine, MG/Brazil. Photos: Vale archive

## Thanks to all employees involved directly or indirectly in the preparation of the Report Integrated 2022.

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Some information in the Integrated Report on pages 13, 17, 18, 53 and 58, published on 20.04.2023, were adjusted on 09.05.2023, after reviewing the data originally disclosed. In these corrections were made to: diagramming and/or translation errors, incorrectly written nomenclatures, geographical corrections and correction of the exchange rate (real to dollar). **The adjusted information is marked on the pages indicated with a redirection icon.**