

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
Form 20-F

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d)
OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended: December 31, 2021

Commission file number: 001-15030

VALE S.A.

(Exact name of Registrant as specified in its charter)

Federative Republic of Brazil

(Jurisdiction of incorporation or organization)

Gustavo Duarte Pimenta, Chief Financial Officer

Phone: +55 21 3485 5000

Praia de Botafogo 186 – offices 701, 1101, 1601, 1701, 1801 and 1901 – Botafogo

22250-145 Rio de Janeiro, RJ, Brazil

(Address of principal executive offices)

Securities registered or to be registered pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common shares of Vale, no par value per share		New York Stock Exchange*
American Depositary Shares (evidenced by American Depositary Receipts), each representing one common share of Vale		
6.250% Guaranteed Notes due 2026, issued by Vale Overseas	VALE	New York Stock Exchange
3.750% Guaranteed Notes due 2030, issued by Vale Overseas	VALE/26	New York Stock Exchange
8.250% Guaranteed Notes due 2034, issued by Vale Overseas	VALE/30	New York Stock Exchange
6.875% Guaranteed Notes due 2036, issued by Vale Overseas	VALE/34	New York Stock Exchange
6.875% Guaranteed Notes due 2039, issued by Vale Overseas	VALE/36	New York Stock Exchange
6.875% Guaranteed Notes due 2039, issued by Vale Overseas	VALE/39	New York Stock Exchange
5.625% Notes due 2042, issued by Vale S.A.	VALE42	New York Stock Exchange

* Shares are not listed for trading, but only in connection with the registration of American Depositary Shares pursuant to the requirements of the New York Stock Exchange.

Securities registered or to be registered pursuant to Section 12(g) of the Act: None
Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act: None
The number of outstanding shares of each class of stock of Vale as of December 31, 2021 was:

4,839,616,924 common shares, no par value per share

12 golden shares, no par value per share

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934.

Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days.

Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer Non-accelerated filer Emerging growth company

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards[†] provided pursuant to Section 13(a) of the Exchange Act.

[†]The term "new or revised financial accounting standard" refers to any update issued by the Financial Accounting Standards Board to its Accounting Standards Codification after April 5, 2012.

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report.

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP International Financial Reporting Standards as issued by the International Accounting Standards Board Other

If "Other" has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow.

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If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).

Yes No

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I. OVERVIEW

We are one of the largest metals and mining companies in the world, based on market capitalization. We are one of the world's largest producers of iron ore and nickel. We also produce iron ore pellets, copper, platinum group metals (PGMs), gold, silver and cobalt. We are presently engaged in greenfield mineral exploration in five countries. We operate large logistics systems in Brazil and other regions in the world, including railroads, maritime terminals and ports, which are integrated with our mining operations. In addition, we have distribution centers to support the delivery of iron ore worldwide. Directly and through associates and joint ventures, we also have investments in energy and steel businesses.

In this report, references to "Vale" are to Vale S.A. References to "we," "us" or the "Company" are to Vale and, except where the context otherwise requires, its consolidated subsidiaries. References to our "ADSs" or "American Depositary Shares" are to our common American Depositary Shares (our "common ADSs"), each of which represents one common share of Vale. American Depositary Shares are represented by American Depositary Receipts ("ADRs") issued by the depositary.

Vale S.A. is a stock corporation, or *sociedade por ações*, that was organized on January 11, 1943 under the laws of the Federative Republic of Brazil for an unlimited period of time. Its head office is located at Praia de Botafogo 186 – offices 701, 1101, 1601, 1701, 1801 and 1901– Botafogo, 22250-145 Rio de Janeiro, RJ, Brazil, and its telephone number is 55-21-3485-5000.

Unless otherwise specified, we use metric units. References to "real," "reais" or "R\$" are to the official currency of Brazil, the *real* (singular) or *reais* (plural). References to "U.S. dollars" or "US\$" are to United States dollars. References to "€" are to Euros. References to "C\$" are to Canadian dollars.

BUSINESS OVERVIEW

OPERATIONAL SUMMARY

The following table presents the breakdown of total net operating revenues attributable to each of our lines of business with continuing operations.

	Year ended December 31,					
	2021 ⁽³⁾		2020 ⁽³⁾		2019 ⁽³⁾	
	US\$ million	% of total	US\$ million	% of total	US\$ million	% of total
Ferrous minerals						
Iron ore	38,701	71.0	27,285	69.0	23,343	63.9
Iron ore pellets	7,053	12.9	4,242	10.7	5,948	16.3
Manganese	175	0.3	225	0.6	282	0.8
Other ferrous products and services	373	0.7	326	0.8	432	1.2
Ferrous minerals - total	46,302	85.0	32,078	81.1	30,005	82.1
Base metals						
Nickel and other products ⁽¹⁾	5,377	9.9	4,652	11.8	3,954	10.8
Copper ⁽²⁾	2,589	4.8	2,175	5.5	1,904	5.2
Base metals - total	7,966	14.6	6,827	17.3	5,858	16.0
Other	234	0.4	640	1.6	686	1.9
Total net operating revenues from continuing operations	54,502	100	39,545	100	36,549	100

(1) Includes nickel coproducts (copper) and byproducts (cobalt, PGMs and other precious metals).

(2) Does not include copper produced in our nickel operations.

(3) Does not include VNC and coal operations.

Ferrous minerals

Iron ore. We operate four systems in Brazil for the production and distribution of iron ore, which we refer to as the Northern, Southeastern, Southern and Midwestern Systems. Each of the Northern and the Southeastern Systems is fully integrated, consisting of mines, railroads, maritime terminals and a port. The Southern System consists of two mining complexes and two maritime terminals.

Iron ore pellets. We currently operate nine pellet plants in Brazil, and two in Oman.

Manganese. We conduct manganese mining operations in Brazil.

Base metals

Nickel. Our principal nickel operations are conducted through our wholly owned subsidiary Vale Canada Limited ("Vale Canada"), which has mines and processing plants in Canada and Indonesia, and controls and operates nickel refining facilities in the United Kingdom and Japan. We also have nickel operations at Onça Puma, located in the Brazilian state of Pará.

Copper. In Brazil, we produce copper concentrates at Sossego and Salobo, in Carajás, in the state of Pará. In Canada, we produce copper concentrates, copper anodes and copper cathodes in conjunction with our nickel mining operations at Sudbury, Ontario and Voisey's Bay, Labrador.

Cobalt, PGMs and other precious metals. Ore mined at our Sudbury, Ontario nickel operations also yields cobalt, PGMs, silver and gold as byproducts, processed at our refining facilities in Port Colborne, Ontario. In Canada, we also

produce refined cobalt at our Long Harbour facilities in Newfoundland and Labrador. We receive silver and gold as byproduct credits from our copper operations at Sossego and Salobo in Brazil.

BUSINESS STRATEGY

In 2021, we continued to take important steps towards building a better Vale. Our ambition is to be a company recognized by society for being: (i) a benchmark in safety, (ii) a best-in-class reliable operator, (iii) a talent-driven organization, (iv) a leader in sustainable mining, and (v) a reference in creating and sharing value. We are dedicated to repairing Brumadinho and to improving life and transforming the future. This is our purpose.

Our main strategic pillars are:

- Safety and operational excellence.
- New pact with society.
- Maximize flight-to-quality in Iron Ore.
- Base Metals transformation.
- Discipline in capital allocation.

Safety and operational excellence

We have the ambition to become a benchmark in safety with clear targets by 2025:

- Zero high-potential recordable injuries.
- 50% reduction of employee exposure to main health risks.
- Reduction or elimination of very high-risk scenarios.

Below is a summary of our key initiatives to achieve these targets:

Hazard Identification and Risk Assessment. Our process safety program starts with the hazard identification and risk assessment (HIRA), by identifying the most critical process risks, and their respective controls. Monitoring the integrity of these controls has become part of our daily maintenance routine. For more information, see *Risk Management—Management of Specific Risks—Operational risks*.

Management Systems for Geotechnical Structures. We are enhancing our Tailings and Dam Management System (TDMS). This initiative is organized around three pillars: routine, performance and risk assessment (known as RPR Management System). We are committed to the implementation of Global Industry Standard on Tailings Management (GISTM) in our operations. In November 2021, we reported adherence to the standard requirements of approximately 60%, according to the self-assessment process. We expect to reach: (i) 90% adherence in 2022 for tailings storage facilities with extreme and very high consequence classification; (ii) 100% for tailings storage facilities with extreme and very high consequence classification in 2023; and (iii) 100% for other structures in 2025, in compliance with the International Council on Mining and Metals (ICMM) timeline.

We are also implementing a Ground Control Management System (GCMS) for waste and stockpiles, open pits and underground mines to extend the standard of care for all of our geotechnical assets.

De-characterization of dams. We are de-characterizing our upstream geotechnical structures (including dams, dikes and drained piles) in Brazil. On December 31, 2021, we had eliminated seven out of 30 upstream structures included in the de-characterization plan. For more information, see *Overview—Business overview—Our environmental, social and governance (ESG) framework* and *—Responses to the rupture of the tailings dam in Brumadinho*.

Vale Management Model. We are implementing our integrated management system, known as “VPS” (Vale Production System), which integrates our processes and systems into one single framework, enabling us to work with unified objectives and in a standardized way. The VPS fosters the creation of a safer work environment and a more effective

problem resolution process. It is composed by three dimensions: leadership, technical and method, which strengthen our organizational culture through people development, standardization of best practices, operational discipline and compliance with routine. With this, we will redefine the path to operational excellence as a more humane, safer and sustainable company. All our employees are being trained to support full engagement with VPS.

New pact with society

We are committed to a comprehensive approach towards sustainability and safety, establishing a positive social, economic and environmental legacy in the regions where we operate and going beyond taxes, social projects and the reparation of Brumadinho. Our sustainability goals are in line with the Sustainable Development Goals (SDG) of the United Nations 2030 Agenda and include commitments relating to:

- Fighting climate change.
- Renewable electricity, energy efficiency and energy matrix transformation.
- Reducing GHG emissions of our supply chain and contributing to reduce clients' carbon footprint by offering high quality products and solutions through partnerships.
- Reducing our atmospheric emissions.
- Forest recovery and protection.
- Water usage reduction.
- Social ambition.

Our social ambition is to be a partner company in the development of resilient communities, engaged in relevant issues to humanity and committed to sustainable mining, with special attention to human rights and the support of indigenous peoples.

Our 2030 goals are to lift 500,000 people out of extreme poverty (people living with less than US\$1.90 per day, as per the World Bank), support indigenous communities neighboring our operations, in view of United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and rank among the top 3 on the social requirements of the main international rating agencies.

For further information about our ESG practices and commitments, see *Overview—Business overview—Our environmental, social and governance (ESG) framework*.

Maximize flight-to-quality in Iron Ore

In the iron ore business, we are committed to optimizing margins under the current market environment, by managing our extensive supply chain and flexible product portfolio to cope with production constraints in the short-term. We are focusing our product line to capture industry trends, improving quality and productivity, controlling costs, strengthening our logistics infrastructure of railroads, ports, and distribution centers, committed to a safe, green and efficient shipping portfolio and enhancing relationships with customers.

- We will continue to promote the Brazilian Blend Fines (BRBF), a standard product with silica (SiO₂) content limited to 5% and lower alumina (1.5%), which offers strong performance in any kind of sintering operation. We produce BRBF by blending fines from Carajás ores and Southern and Southeastern ores, which are complementary ores for our blending strategy. BRBF is produced in our Teluk Rubiah Maritime Terminal in Malaysia and in seventeen ports in China. This process reduces the time needed to reach Asian markets and increases our distribution capillarity by allowing the use of smaller vessels. Our blending strategy also enables the use of iron ore with lower iron concentration from the Southern and Southeastern Systems, allowing more efficient mining plans and increasing the use of dry processing methods, which in turn reduce capital expenditures, extend the life of our mines, reduce use of dams, and reduce water consumption by our operations: a key flexibility to cope with the short-term challenges.

- We continue to improve our portfolio in order to provide our customers with solutions and to adapt to potential market demands. In 2021, we announced the launch of iron ore green briquette, a new proprietary product, developed by the company through over 20 years of research, which can allow a reduction of over 10% of greenhouse gases emissions in the steel production by our steelmaking clients. The “green briquette” is a result of cold agglomeration of iron ore, by using a breakthrough technology solution that can use in its binder a composition sand from the treatment of mining tailings, resisting the blast furnace’s high temperatures without disintegrating. The low temperature of cold agglomeration (200°C) allows for 80% less CO₂ emission when compared to pelletizing process (approximately 1300°C). We continue to work on the development of low CO₂ iron making technologies and services to support our customers as they transition to low CO₂ steelmaking.
- Our goal is to achieve an overall run-rate capacity of 400 Mtpy in the medium term. In the Northern System, our plan is to have high-quality growth with new low-cost assets, ramping up and opening new mining fronts to reach a capacity of 215 Mtpy in the medium term. In the Southeastern System, we are investing in increasing our pellet feed production, developing tailings filtration and dry stacking and reaching approximately 113 Mtpy of capacity in the medium term. Finally, in the Southern System we are committed to solving the interference of upstream dams in our operations, reaching approximately 69 Mtpy of capacity.
- Another key goal is to increase our flexibility by creating capacity buffers across iron ore operations. We currently expect to achieve over 50 Mtpy capacity buffer in the long-term through initiatives that include: (i) expanding Northern System through opening new mining pits and obtaining new licenses, such as Northern System 240 Mtpy and Serra Sul 120 projects as well as the opening of N3 mining front in Serra Norte, (ii) developing the 18 Mtpy capacity Capanema project in Southeastern System, and (iii) unlocking capacity in Vargem Grande complex.
- We continue to invest in solutions to reduce our reliance on new dams and dam raisings. In 2021, we reached an approximate 70% share of dry processing production compared to 40% in 2014. Once we reach the 400 Mtpy capacity and complete the implementation of other related projects, including the production increase in Northern System, the conversion of Plant 1 in Serra Norte to dry processing, the Capanema project start-up, and the implementation of tailings filtration plants and dry concentration facilities, we expect to have only approximately 15% of our production based on tailings disposal in downstream dams.
- In order to treat the tailings from wet processing, we are investing in tailings filtration systems to allow us to reduce the disposal of tailings in dams and also to operate certain mines and plants without using tailings dams. We have announced an estimated investment of US\$2.2 billion between 2019 and 2026 in some of our sites, including Vargem Grande Complex, Itabira Complex and Brucutu, to be operated with tailings filtration systems and dry stacking tailings disposal, which consists of filtering and stacking of partially dewatered tailings, reducing our reliance on tailings dams. In 2021, we invested US\$504 million in tailings filtration system and dry stacking tailings disposal, and we started the operation of the Vargem Grande filtration plant, the first of four plants under construction in Minas Gerais.
- We have also developed a certified sand for application in the civil construction market in order to reduce the volume of tailings disposed in dams. In line with this goal, we acquired New Steel in January 2019, bringing in innovative technologies for the dry beneficiation of iron ore, and approved an investment of US\$125 million in the world’s first industrial-scale dry magnetic fines concentration plant to produce 1.5 Mtpy with the start-up expected for 2023 in the Vargem Grande complex.

Base metals transformation

Nickel. A key aspect of our strategy for the nickel business is retaining our product leadership position supplying nickel for the global renewable energy transition, while striving to be a sustainable operator and a global benchmark for health and safety in the industry and in the communities where we operate. We are focused on transforming the business, continuing to review asset utilization, optimizing our operations and concentrating our efforts to increase productivity and improve returns, while preserving capacity for growth. We are one of the world’s largest nickel producers, with

large-scale, long-life and low-carbon assets. Leveraging our substantial resource base and diversified mining operations, we produce nickel products from nickel sulfide and laterite sources utilizing advanced technology. Our commercial footprint is global, with a focus on providing top tier customer service.

Our nickel products are tailored to meet the needs of customers across different industries and geographies, including those requiring high-purity nickel as well as the rapidly evolving electric vehicle battery supply chain. In 2021, 45% of our global nickel production comes from our Canadian operations, which benefit from the use of renewable energy, and a stable jurisdiction with strong ESG standards and credentials.

Our main product, Class 1 nickel, places us in a unique position with environment-friendly operations in the North Atlantic, in line with our low-carbon agenda, positioning us well to supply the North American electric vehicle market. We have recently announced a multi-year agreement to supply low-carbon nickel to an European battery producer. We also have an agreement to sell our Class I nickel to a North American electric vehicle manufacturing. In the medium-term, we are targeting to direct 30-40% of our Class I nickel production to the North American electric vehicle market. We are also exploring other partnerships on a regular basis.

The plating rounds and nickel melt rounds from our Long Harbour processing plant, a leading-edge hydrometallurgical facility on Canada's East Coast, are one of the least carbon-intensive nickel products on the market. With a carbon footprint of 4.4t CO₂e per tonne, these Class I nickel products position us well for supplying to the electric vehicle industry. For more information about our low carbon nickel products, please access <http://www.vale.com> (under English Version/Investors/ESG Portal/Environment/Low Carbon Products). In 2021, we made significant advancements on two replacement projects in Canada: the Voisey's Bay Underground and phase 1 of the brownfield expansion of Copper Cliff Mine. Both projects have high nickel content and a significant amount of base-metal/precious metal byproducts. We also have opportunities to further expand operations at Onça Puma in Brazil, and the option to develop, through joint ventures, the Pomalaa and Bahodopi projects in Indonesia.

Copper. Copper has a solid long-term growth profile, driven by industrialization, construction, and electrical grid infrastructure expansion. Governments around the world have set ambitious decarbonization targets that, along with the dropping of renewable energy costs and green economy and stimulus investments, will be crucial for more intensive use of copper in renewable energy and electric vehicle-related infrastructure projects. We have significant opportunities to expand our copper business through organic growth. We have a strong portfolio of copper assets and we intend to develop a multi-year copper expansion plan, with Salobo III, Alemão and Cristalino as competitive projects that will support our strategic objective of 450 thousand tons per year of production capacity by 2027. In addition to these projects, we have other opportunities to grow in the future, leveraging the knowledge and logistics that already exist in the Carajás region, while also evaluating opportunities to increase copper production in Canada and Indonesia. In Indonesia, we are advancing studies to develop the Hu'u project, a world-class deposit, which could further expand our copper business. We are also engaged in greenfield exploration for copper in some of the world's most prolific belts, looking for tier-one assets for future development.

Discipline in capital allocation

We reaffirm our strong commitment to a sound balance sheet, a lean portfolio and value creation for our stakeholders. In 2021:

- As of December 31, 2021, our total outstanding debt was US\$12.180 billion, and our cash and cash equivalents position was US\$11.721 billion. We achieved a net debt level of US\$1.877 billion as of December 31, 2021 (calculated as total outstanding debt less cash and cash equivalents, and short-term investments), compared to US\$769 million as of December 31, 2020. Our net income from continuing operations of US\$24.844 billion and our consolidated Adjusted EBITDA from continuing operations was US\$31.343 billion in 2021, representing a 0.06x net debt to Adjusted EBITDA ratio. For a reconciliation of Adjusted EBITDA to net income, see note 4 to our consolidated financial statements.
- We sold our interest in Vale Nouvelle-Calédonie S.A.S. (VNC).
- We entered into an agreement to sell our coal operations in Mozambique.
- We paid US\$13.5 billion in dividends to shareholders and repurchased US\$5.5 billion of our shares.

Our dividend payment policy aims at returning to our shareholders a relevant portion of our cash generation, in a predictable pattern and aligned with our strategic pillar ‘Discipline in Capital Allocation’.

SIGNIFICANT CHANGES IN OUR BUSINESS

We summarize below major events in our business since the beginning of 2021.

Reparation agreement relating to Brumadinho dam failure

In February 2021, we entered into a settlement agreement with various public authorities for the reparation and remediation of socio-environmental and social-economic damages resulting from the Brumadinho dam rupture. The agreement was a milestone in the reparation process, resolving numerous claims, as well as establishing several projects and actions for the full reparation and remediation of the negative impacts of the Brumadinho dam rupture. The agreement, aimed at adopting quick, fair, and effective solutions, was negotiated in a process conducted with transparency, legitimacy and legal certainty. Each of these projects and actions contemplated in the settlement agreement has been designed to provide comprehensive remedies and technical solutions for each specific situation. For a discussion about this settlement agreement and other issues relating to the Brumadinho dam rupture, see *Overview—Business overview—Responses to the rupture of the tailings dam in Brumadinho*.

Developments related to the COVID-19 pandemic

Since the outbreak of COVID-19, we have taken steps and implemented health and safety policies and protocols to safeguard our employees, businesses and communities surrounding our operations from the threats posed by the pandemic. In 2021, our operations at Salobo and Sossego in Brazil were temporarily suspended, and we experienced increased absenteeism in our operations in Canada, particularly in the last quarter of 2021. Temporary suspensions and absenteeism had no material impact in the results of our operations.

Divestments

Since the beginning of 2021, we have completed certain divestments and entered into agreements for divestments. These divestments are in line with our strategic pillar of capital discipline, continued focus on our core businesses and commitment to a lean portfolio.

Sale of Vale New Caledonia. In March 2021, our subsidiary Vale Canada concluded the sale of its ownership interest in VNC to Prony Resources. Prony Resources is a consortium of VNC management and employees, supported by both the New Caledonian and French authorities and having Trafigura as a minority shareholder. The deal provides the former VNC operations with a financial package totaling US\$1.1 billion, of which Vale Canada contributed US\$555 million to support the continuity of the operations. In addition, we will continue to have the right to a long-term nickel supply agreement for a proportion of the operation's production, allowing VNC to continue addressing the growing demand for nickel by the electric vehicle industry.

Acquisition of Mitsui stake and prepayment of Nacala Corridor Project Finance. In June 2021, in preparation for a sale of our coal operation, the concessionaires of Nacala Logistics Corridor (“NLC”), located in Mozambique and Malawi prepaid the Nacala Corridor Project Finance, which had an outstanding balance of approximately US\$2.5 billion, with funds provided by us. The settlement of the project finance was the final condition precedent to complete our acquisition of Mitsui's interest in NLC. Following the acquisition of Mitsui's stakes, and therefore simplification of governance and asset management, we started the process of divesting our participation in the coal business.

Sale of Coal Assets. In December 2021, we entered into a binding agreement with Vulcan Resources (formerly known as Vulcan Minerals - “Vulcan”) to sell our coal operations, which consist of Moatize mine and the NLC for US\$270 million, plus a 10-year royalty agreement subject to certain mine production and coal price conditions. The closing of the transaction is subject to the satisfaction of customary conditions precedent, including but not limited to the approval of the Ministry of Mineral Resources and Energy of Mozambique, the approval of the Government of Mozambique for

the change of control and antitrust.

Sale of Midwestern System assets. In April 2022, we entered into a binding agreement with J&F Mineração Ltda. (“J&F”) for the sale of all the shares issued by Mineração Corumbaense Reunida S.A., Mineração Mato Grosso S.A., International Iron Company, Inc. and Transbarga Navegación Sociedad Anónima, which hold our iron ore, manganese ore and logistics assets in the Midwestern System. The agreed enterprise value of the transaction is approximately US\$1.2 billion for the assets. At closing, we expect to receive approximately US\$150 million, in addition to transferring to J&F the obligations related to the take-or-pay logistics contracts, subject to the consent of the applicable counterparties, and other liabilities existing in the transferred assets. The completion of the transaction is subject to customary conditions precedent, including but not limited to the approval by antitrust authorities (CADE), the National Agency for Waterway Transportation (ANTAQ), the National Defense Council (CDN) and other authorities.

Sale of interest in Mosaic. In November 2021, we sold all of our common shares of The Mosaic Company for approximately US\$1.26 billion in a block trade. We had received these shares as part of the consideration for the sale of our fertilizer business to The Mosaic Company in 2016.

Sale of ownership in CSI. In February 2022, we sold our 50% ownership interest in California Steel Industries, Inc. (CSI) to Nucor Corporation, for approximately US\$437 million. Upon completion of the transaction, we recorded a gain of approximately US\$218 million.

Sale of interest in YVY. In 2021, we concluded the sale of our 25% interest in Anyang Lu Vale Yongtong Pellet Co., Ltd. (YVY) to Anyang Iron & Steel Co., Ltd. for US\$14 million.

Sale of small hydroelectric plants. In 2021, we sold the small hydroelectric power plant of Mello, located in Minas Gerais, for US\$1 million. Additionally, we have signed the sale of the small hydroelectric plants of Glória and Nova Maurício, both located in Minas Gerais, for US\$6 million. The closing of the transaction is expected for 2022, subject to usual conditions precedent.

Sale of Ferroalloys and Manganese operations of Vale Manganês. In January 2022, we sold our ferroalloys operations in Barbacena and Ouro Preto and our manganese mining operations at Morro da Mina, in the state of Minas Gerais, to VDL Group (“VDL”) for a total consideration of US\$40 million, on a debt-free cash-free basis. As a result, we no longer have manganese ferroalloys operations.

New projects

Briquetting plants. In December 2020, we approved the conversion of pelletizing plants 1 and 2 at the Tubarão complex, into iron ore briquetting plants, to produce the “green briquette”. This project is aligned with our strategy to Maximize Flight-to-Quality in Iron Ore and to reduce Scope 3 net emissions by 15% by 2035, with 2018 as baseline. We also approved the construction of a new briquetting plant in the Vargem Grande complex. The initial production capacity of these three plants will be approximately 7 million metric tons per year. The start-up of the three plants is expected by 2023, and total investment amounts to US\$185 million.

Thompson Phase 1 Project. In June 2021, we approved a US\$123 million investment package for the Thompson Phase 1 Project, which will extend current mining activities in Thompson, Manitoba for at least 10 years. The Thompson Mine Extension (“TME”) is a two-phase project and the first approved phase includes the construction of critical infrastructure, such as extension of ventilation system and increased backfill capacity, which will enable and debottleneck mining of deeper parts of the existing orebodies. We have also approved a bold near-mine exploration strategy for Thompson that will support approval of TME Phase 2, that includes development of new orebodies.

Rio Tocantins railroad bridge. In March 2022, we approved the construction of a new railroad bridge over the Tocantins River, in the municipality of Marabá, state of Pará. This project will increase the Carajás railroad (EFC) capacity, improving rail traffic flow, as well as mitigating business risks, by duplicating the existing single line bridge. The project is expected to start up in 2027 with a total investment of US\$830 million and includes a second road bridge for

automotive traffic that will enhance the link between the southeast of the state of Pará and the Brazilian northern coast. The current single bridge is part of the EFC railway, through which we ship our all our iron ore production from the Northern System as well as the copper concentrate produced in the state of Pará.

Tecnored plant. In April 2022, we started the construction works of Tecnored's first commercial plant in Marabá, in the state of Pará. Tecnored is 100% owned by us and is focused on developing a low-carbon pig iron process through energy sources, such as biomass, syn-gas and hydrogen that emit less CO₂ than coal and coke, the traditional iron-making methods. The plant will initially have a production capacity of 250 thousand tons per year of green pig iron and may reach 500 thousand tons per year in the future. The start-up is planned for 2025 with an estimated investment of approximately US\$374 million.

For more information about our projects, see *Information on the Company—Capital expenditures*.

Resumption of Samarco's operations

In December 2020, Samarco commenced the gradual resumption of its operations, with the integrated restart of iron ore extraction and beneficiation in the Germano complex, located in Mariana, state of Minas Gerais, and pelletizing at the Ubú complex, located in Anchieta, state of Espírito Santo. Samarco's operations are resuming with approximately 7 to 8 Mtpy production capacity, with the use of one of three concentrators to beneficiate iron ore in the Germano complex and one of four pellet plants in the Ubú complex, representing 26% of Samarco's productive capacity. The integrated restart of operations occurs following extensive commissioning tests after the five-year halt. Samarco will use new processes for tailings disposal, reflecting its commitment to a sustainable restart and operational safety. In 2021, Samarco produced 7.87 Mt.

Through the implementation of the filtration process, Samarco expects to be able to substantially dewater sand tailings, which represent 80% of total tailings volume, and stack these filtered sand tailings in piles safely. The remaining 20% of tailings are planned to be deposited in Alegria Sul pit, a bedrock self-contained structure, which is safer than a tailings dam. Additionally, Samarco is progressing in the decommissioning of Germano dam, following the safety standards required. Samarco operates a Monitoring and Inspection Center in real time to monitor the stability and safety of its geotechnical structures.

OUR ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) FRAMEWORK

We are committed to fully integrating sustainability into our business through a comprehensive approach based on systematic planning and execution, prioritizing risk and impact management, and establishing a positive social, economic and environmental legacy in the places where we operate. Our practices related to ESG are evolving.

In 2021, we launched our first Integrated Report, in accordance with the International Integrated Reporting Council (IIRC) as well as to GRI standards. The report presents a performance approach and an appendix – the ESG Databook, with indicators from the Global Reporting Initiative (GRI); the Metals and Mining segment of the Sustainability Accounting Standard (SASB); the Task Force on Climate-related Financial Disclosures (TCFD); core metrics of the World Economic Forum (WEF) and Sustainable Development Goals (SDGs). It also presents our adherence to ICMM's Mining Principles. To see our latest Integrated Report, please access: <http://www.vale.com> (under English Version/Investors/Corporate Information to the Market/Annual Reports). Our Integrated Report is not incorporated by reference in this annual report on Form 20-F.

We have been increasing our engagement with socially responsible investors and key ESG stakeholders through webinars, roadshows and a dedicated website, Vale's ESG Portal (www.vale.com/esg). The information in our ESG Portal is not incorporated by reference in this annual report on Form 20-F. Based on studies from leading ESG advisors, we have identified 63 major gaps with respect to ESG best practices. Based on this assessment, we mapped out an ESG action plan to address these gaps. By December 31, 2021, we had closed 54 gaps. After the rupture of the tailings dam in Brumadinho, we decided to strengthen our interactions with ESG stakeholders to discuss a range of strategy, risk and

governance-related matters and accelerate our ESG initiatives. We are committed to eliminating our ESG gaps by 2030 (our “2030 Commitments”).

Our ESG Portal provides greater transparency about our initiatives. Below are the highlights of our main ESG accomplishments in 2021 and ongoing initiatives:

Environmental

Climate Change. We are committed to leading the transition towards a net-zero mining industry. We are committed to contributing with solutions that will help limit the increase in the average global temperature to below 2°C, as set forth in the Paris Agreement. We endorsed and we are aligned with the Task Force on Climate Related Financial Disclosures (TCFD) framework for risks and opportunities related to climate change. We published the 2021 Climate Change report, following TCFD recommendations and we assessed transition risks (possible impacts in our portfolio) and physical risks (mapped physical impacts for our operations). For more information, please see <http://www.vale.com> (under English Version/Investors/ESG Portal/Environment/Climate Change). Information in our website is not incorporated by reference in this annual report on Form 20-F.

We have goals related to climate change risk management, including targets to reduce Scopes 1 and 2 absolute emissions by 33% by 2030, with 2017 as baseline, and to become net-zero carbon by 2050. We recognize that we can only lead the mining industry towards a low carbon economy if we lead our value chain in the same direction. Our Scope 3 emissions, annually calculated and verified by independent third parties, represent 98% of our total emissions and are not under our direct control. We are committed to reduce Scope 3 net emissions by 15% by 2035, with 2018 as baseline, which is based on development of new products, nature-based solutions, partnership and engagement with clients and suppliers. The Scope 3 target will be revised every five years, given the uncertainties regarding low carbon technologies and climate policies.

Scopes 1 and 2 decarbonization plan: We have built a roadmap, with clear milestones, to meet the reduction targets in Scopes 1 and 2. We plan to invest US\$4 to 6 billion over the next 10 years to develop low carbon solutions, such as electrification, biofuels use and renewable electricity generation and use. Our current portfolio of initiatives consolidates more than 40 projects, prioritizing the most cost-competitive initiatives to achieve the 2030 target, based on a Marginal Abatement Cost curve (MAC Curve). All investment decisions are submitted to an analysis considering internal carbon price of US\$50 per ton of CO₂ to encourage investments in greenhouse gas (GHG) emission reduction, in part by incorporating a scenario of more restrictive regulations, and as a tool to help implement our emission reduction targets. We intend to reduce GHG in our operations by increasing the processes’ energy efficiency, and by developing solutions based on replacing usual energy sources by greener alternatives. These initiatives include, among others, the use of biofuels replacing fossil fuels, electrification of equipment and processes, use of alternative fuels, carbon capture technologies, and development of alternative processes.

Scope 3 decarbonization plan: More than 90% of our Scope 3 emissions relates due to the processing of the iron ore in the steel industry. We have identified two pillars of the Scope 3 roadmap: (i) portfolio differentiation, with high quality products and low CO₂ iron making technologies and services for the steel industry; and (ii) partnerships in shipping and in the steel sector. We can offset up to 20% of the target with nature-based solutions.

For the first pillar, we are considering our higher-quality iron products and agglomerates which will favor the migration to the lower emitting Electric-Arc Furnace (EAF) route. Moreover, steel emission reductions will be reached based on biomass-based pig iron production (through our proprietary Tecnoored technology), among other solutions.

For the second pillar in Scope 3 emissions roadmap, we completed an investment of US\$6 million in Boston Electrometallurgical Company to acquire a minority stake and promote the development of a technology focused on steel decarbonization by using electricity, in early 2021.

In order to provide low carbon solutions to the steel industry, we have signed a memorandum of understanding (MoU) with Ternium S.A., Baowu Steel Group and Jiangsu Shagang Group Co., Ltd, where the companies agreed to pursue opportunities to develop steelmaking solutions focused on reducing CO₂ emissions.

Additionally, we have signed an MoU with Posco related to developing ironmaking solutions to reduce CO₂ emissions, and an MoU with XCMG Construction Machinery Limited to evaluate the potential supply of mining and infrastructure equipment, including zero-emission and autonomous equipment.

In 2021, we made progress on our Climate Agenda with new technologies being tested at ships that transport our iron ore and the iron ore agglomerate. Our EcoShipping initiative manages a roadmap of innovative technologies aligned with the International Maritime Organization targets, with projects on energy efficiency (e.g. rotor sails and air lubrication) and alternative fuels (e.g. multi-fuel tank). In July 2021, the first large ore carrier equipped with rotor sails arrived at the Tubarão port. The system will allow an energy efficiency increase of up to 8% per vessel per year. In August, the first ore carrier with air-lubrication technology, which we estimate could reduce fuel consumption by around 5 to 8%, arrived at Ponta da Madeira port.

In 2021, we made several efforts to reduce greenhouse gases emissions and mitigate climate change, and we spent US\$187 million on these initiatives.

Energy. The three pillars of our energy initiatives are: (a) renewable electricity, (b) energy efficiency and (c) energy matrix transformation. Our targets are to (i) achieve 100% renewable electricity consumption in Brazil by 2025, and to reach 100% of our consumption globally through renewable electricity by 2030, and (ii) improve by 5% the global energy efficiency indicator (specific consumption) in relation to the 2017 baseline by 2030. In 2021, 99% of our electricity consumption in Brazil and 89% globally came from renewable sources. We ended 2021 with 36% physical progress in the Sol do Cerrado Solar Power Generation Project, which we expect to supply 13% of our annual estimated demand for Brazil in 2025.

Water. We are committed to reducing fresh water use in our activities by investing in new technologies, in the expansion of our monitoring network and in other initiatives to control total water collection, especially by promoting water reuse, which in 2021 represented 81% of total production demand. We are currently developing programs and implementing actions that go beyond compliance with the legal requirements to optimize water use and consumption. The Water Target set in 2018 had a commitment to reduce freshwater withdrawal for use in our production processes. The goal was to reduce 10% of specific use by 2030 (freshwater withdrawal and used in processes per ton produced), which means lower volume of new water captured for the same production volume. Throughout 2021 the accumulated results exceeded the established goal (achieved 20%). Thus, new goals are being prepared in 2022.

Forest conservation. Our ambition is to act as a global catalyst for forest conservation and reforestation. Currently, we help to protect approximately one million hectares of forest as a result of compensation measures, voluntary initiatives and partnerships. We are committed to protecting 400,000 hectares and reforesting additional 100,000 hectares by 2030 on a voluntary basis, bolstering our 2018 target.

Waste. In 2020, we approved our Mining and Metallurgical Waste Management Policy to encourage the transition of our waste management to a circular economy perspective. Such transition is possible through innovation. In addition, in 2021, we achieved 70% of our production by dry processing method, in line with our goal of having at least 70% of our total production coming from dry processing. In order to sustain this target at an iron ore production level of 400 Mtpy, we are implementing several initiatives, such as our blending strategy, the expansion of Northern System to 240 Mtpy, the Capanema project implementation and the conversion of Plant 1 in Serra Norte to dry processing. In 2021, we announced the development of a commercial quality sand for civil construction applications – a sustainable alternative for a material that has long suffered from predatory extractivism. These efforts are the result of seven years of research and approximately R\$50 million in investments.

Social

Social ambition. Brumadinho forever changed the way in which we operate. We will never forget this event, nor will we ever stop working to fully repair its impacts. We are committed to a New Pact with Society.

In the social dimension, we want to be part of alliances and partnerships that articulate solutions to challenges faced by society. In 2021, we launched our social ambition, which is “to be a partner company in the development of resilient communities, engaged in issues relevant to humanity and committed to sustainable mining.”

We have also launched new 2030 commitments:

- Ranking sector TOP 3 in the social requirements of the main external assessments (MSCI, Sustainalytics and DJSI) of sustainable mining.
- Taking 500,000 people out of extreme poverty line (people living on less than US\$ 1.90 per day).
- Supporting indigenous communities neighboring our operations as they develop and implement plans in pursuit of their rights established under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

Human Rights. We are committed to the United Nations Guiding Principles on Business and Human Rights (UNGPs). Our Global Human Rights Policy reinforces the guidelines related to Human Rights management and allows for greater alignment with the UNGPs. Since 2020, Human Rights has been part of our Global Risk Integrated Map and our operations register their human rights risk assessment, mitigation controls and action plans in our global risk management system.

We are committed to performing Human Rights due Diligence (HRDD) in all operations and critical projects in 3-year cycles. By 2023, all operations will have undergone Human Rights due diligence. Our Human Rights department monitors the risk controls and the external due diligence carried out.

Community involvement. In order to engage communities and other local players in the regions where we operate, as well as improve and maintain this engagement, we have established structured dialogue spaces for creating “Relationship Plans” with these communities. These plans have as their main principles: (i) the social engagement in the definition and prioritization of initiatives to be implemented in the communities; and (ii) the use of participatory meetings to monitor the performance, assessing adherence, and effectiveness of the results together with the communities.

In 2021 we evaluated the processes of social involvement in our operations and began action plans to overcome gaps and process improvements. Our relationship channels with our stakeholders are now more integrated, which helps us promote dialogue and improve our relationship management processes anticipating and treating risks, impacts and possible conflicts and rights violations.

Indigenous Peoples and Traditional Communities. Our guidelines with respect to indigenous people and traditional communities are built upon the ICMM's position statement on Mining and Indigenous Peoples. In line with our Social Ambition commitments, we established the Indigenous Pillar prioritizing three action fronts: Preservation of Cultural Memory, Indigenous Protagonism, and Sustainable Programs. One of the initiatives undertaken was the Indigenous Program of Endurance and Opportunities at the University – PIPOU, in Portuguese. This project is being developed in partnership with non-governmental organizations, indigenous higher education specialists, and representatives of the indigenous social movement who contribute to the definition of a strategy for greater scope of the program at the national level.

Socioeconomic Contribution. We are committed to positively impacting society, by investing in socioeconomic actions and projects focused on community development. In particular, we are investing in actions that contribute to

the development and improvement of urban infrastructure and mobility, traditional communities, education, culture, health, and work and income generation in the regions where we operate. We spent US\$473.5 million on social initiatives in 2021, of which 47% was spent on voluntary and mitigating programs, 27% on Brazilian-tax-exempted programs, and 26% on mandatory programs.

Diversity and Gender Balance. Thinking of a future leadership that is increasingly diverse and inclusive, we have brought forward by five years, to 2025, the goal of achieving 26% female participation in the workforce. In 2021, we achieved 18.7% representation of women, a 17.9% increase in the total number of women in Vale compared to 2020. We also achieved 20.3% of women in senior leadership (executive manager positions and above), a 27.6% increase in the representation of women in senior leadership positions compared to 2020.

In addition, we announced our commitment to increase the representation of black men and women by reaching 40% of our leadership roles in Brazil with black employees by 2026, up from 29%, a number measured by conducting a self-declaratory census with employees in Brazil.

Health and Safety. We are committed to improving the health and safety of our workers, consistent with our pillar of Safety and Operational Excellence. Our long-term goals are: (i) no recordable injuries with potential for fatality or life-altering injuries, (ii) 50% reduction in the exposure of employees to the top 10 health risks by 2025 and (iii) reduction or elimination of the most significant risk scenarios by 2025.

Governance

Corporate Governance. Since 2018, we have been listed on the Novo Mercado segment, the highest level of governance of B3. We have been investing in the improvement of our corporate governance, with benchmarks in national and international best practices, and developing our understanding of investors' perspective on these matters.

We are committed to corporate governance best practices, which help us compete more efficiently, sustain our success and generate long-term value for shareholders with a commitment to integrating sustainability into our business, building a strong positive economic, social and environmental legacy, and mitigating the impacts of our operations.

Our governance model aims to establish clearly defined principles and roles, transparency, and stability in order to guide our actions. We seek to build strong and lasting relationships with our stakeholders, invest in mitigating the effects of our activities, work with high ethical standards, practice transparent management, and actively contribute to advances in relation to the environment, biodiversity and sustainable development.

The general guidelines and policies that guide our business activities are established by the Board of Directors, which monitors the implementation of these initiatives through reports provided by our executive officers. Our Board receives support from the Advisory Committees, whose mission is to advise the Board, including proposing improvements related to its area of activity in order to facilitate greater efficiency and quality in decisions made by the Board of Directors and to ensure that our activities are carried out in compliance with current legislation, the principles of ethics and internal controls. The Fiscal Council is a permanent, supervisory body, independent from the Board of Executive Officers and the Board of Directors, which is responsible, through the principles of transparency, equity and accountability, to supervise the management's activities and verify the compliance with the bylaws and their legal duties.

In 2020, we established the Audit Committee and the Nominating Committee, in order to continuously improve our governance. In 2021, we created the Innovation Committee dedicated to analyzing new technologies and other business' initiatives. For more information, see *Management and Employees—Management—Board of Directors* and *Other Advisory Committees to the Board of Directors*.

Compensation. We are committed to aligning our compensation programs to our business strategy and the goal of making Vale a safer company. We implemented a number of changes, such as the adoption of a *malus* clause and a clawback policy under which, upon the occurrence of events of exceptional severity, the Board of Directors may reduce variable compensation of executives or require that executives return amounts received, and the implementation of

new share ownership guidelines for executive officers. Since 2020, we are following new standards for Executive Officers compensation: for short-term compensation, at least 30% of performance goals must be ESG-driven and directly related to safety, risk management and sustainability targets, and with respect to long-term compensation, at least 20% of performance goals must be based on ESG metrics. Overall, 12% of total remuneration must be linked to ESG metrics.

Risk Management. We have five risk executive committees that advise our management concerning each of these risks categories: (i) operational risks, (ii) geotechnical risks, (iii) strategy, finance and cyber risks, (iv) compliance risks and (v) sustainability, institutional relations and reputational risks.

We also have seven advisory committees established by our Board of Directors, two of them, in particular, with major roles in advising the Board on and monitoring our risks: the Audit Committee, which evaluates and monitors the effectiveness and sufficiency of our controls and risk management system, and the Operational Excellence and Risks Committee, which focuses in the operational and geotechnical risks. The Audit Committee, among other matters, advises the Board of Directors on adequate risk management processes, holding periodic meetings with management (Internal Controls and Risks) to periodically assess our Integrated Risk Map, monitor the implementation of our new B Wise risk management system and discuss our critical and highly critical risks, as well as controls necessary to mitigate them. The Operational Excellence and Risk Committee, among other matters, advises the Board of Directors holding periodic meetings with management regarding the structure and practices to effectively identify and manage operational, geotechnical and operational continuity risks, monitors risks with critical and highly critical impacts, as well as proposes improvements in mitigation plans and monitors our governance model known as Vale Production System (VPS) to ensure more productive, safer and environmentally responsible operations and the integrity of our assets.

RESPONSES TO THE RUPTURE OF THE TAILINGS DAM IN BRUMADINHO

On January 25, 2019, a tailings dam ruptured at our Córrego do Feijão mine, in the city of Brumadinho, state of Minas Gerais. The rupture of the dam released a flow of tailings residue, which submerged our administrative area at the Córrego do Feijão mine and reached parts of the communities of Córrego do Feijão and Parque da Cachoeira outside of Brumadinho, and the nearby Paraopeba River. The dam rupture resulted in 270 fatalities, including six victims still missing, and caused extensive property and environmental damage in the region.

We will never forget Brumadinho. We reaffirm our respect for the victims and their families, prioritizing the fair and agile reparation of Brumadinho. As we move forward on our path to making our business better, valuing people, safety and reparation, we continue firm in our commitment to become one of the safest and most reliable mining companies in the world.

Reparation and remediation efforts

We have provided humanitarian assistance to victims and their families since the very first moments. Below is a summary of our key reparation and remediation efforts:

- Our emergency actions to support impacted people and regions included psychological and health care, financial aid, sheltering, food and other essential items, transportation and logistics, emergency safety measures and infrastructure works, animal rescue and care, infrastructure for water supply to the metropolitan region of Belo Horizonte, support to authorities, and donations to municipalities, among other things.
- In September 2020, we announced the Full Reparation Program, a program for comprehensive reparation of damages caused by the Brumadinho dam rupture. The program results from an open dialogue with authorities and the affected communities and includes many initiatives and projects.
- The Full Reparation Program follows the recommendations contained in the February 2020 report of the Independent Ad Hoc Consulting Committee for Support and Reparation (CIAE-AR), an ad-hoc committee created by our Board of Directors to monitor our measures to support the affected community and to remediate the impacted area. In January 2021, a consulting firm conducted an external assessment and reviewed all the actions taken by us and concluded that all the recommendations contained in the report had

been addressed. Additional information is available on our ESG Portal, at www.vale.com/esg. Information in our website is not incorporated by reference in this annual report on Form 20-F.

- In 2021, we incurred over US\$1.898 billion to pay for compensation to impacted people, infrastructure works and environmental and socioeconomic reparation actions.
- The environmental reparation activities extend over 26 municipalities located along the Paraopeba River, and involve sediment containment and removal, monitoring of water quality, and preservation and restoration of fauna and flora.
- We have concluded work on two pipelines for water withdraw on the Pará River, in the city of Pará de Minas, as part of the construction of new water supply systems to serve the population of Pará de Minas and the metropolitan area of Belo Horizonte. We expect to deliver a third one, on the Paraopeba River, in the first half of 2022. We have more than 450 water collection, supply and treatment works in 31 municipalities, including the hydrographic basins: Paraopeba, Velhas and Doce. We also completed essential social infrastructure works, with the delivery of daycare facilities and a health care unit to communities of Brumadinho and Mario Campos, and a school for 400 students to the community of Macacos, all in the state of Minas Gerais. In Brumadinho, we are renovating a multi-sport gymnasium complex and all 20 public schools.

Dam safety measures

We have implemented several initiatives to enhance our tailings and dam management process and improve dam safety.

De-characterization of upstream dams. Our key initiative is the de-characterization of all of our 30 upstream structures in Brazil, including dams, dikes and drained piles. 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. The term “de-characterization” 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.

On February 25, 2022, we signed an agreement (*termo de compromisso*) with the state of Minas Gerais, regulatory agencies and state and federal public prosecutors, establishing a schedule and reinforcing the commitment to de-characterize all of our upstream structures in Brazil. The agreement brings more legal and technical certainty to the process of de-characterization of our upstream dams in Minas Gerais, considering that original deadline set forth by Law 23.291/2019 was technically unfeasible, and was extended reflecting the required actions to increase safety during the works. Under the terms of the agreement, we will hire an independent consultancy firm to confirm deadlines that are technically feasible for the de-characterization of each structure included in our plan, and we will contribute with a value of R\$236 million for investments in social and environmental projects, to be disbursed over eight years. For more information please see <http://www.vale.com> (under English Version/Investors/ESG Portal/Dams/De-characterization Program). Information in our website is not incorporated by reference in this annual report on Form 20-F.

The de-characterization of upstream structures is a complex process and may take a long time to be concluded with the necessary safety precautions. The works related to the de-characterization process may influence the geotechnical stability conditions and increase the risk of such structures. See *Overview—Risk factors—Risks relating to dam rupture*. We are conducting detailed engineering studies for each structure to be de-characterized, and may need to improve the construction or build additional containment structures (*Estrutura de Contenção a Jusante* - ECJ or back-up dams) to safely proceed with the de-characterization. For instance, for certain dams, we have to build downstream back-up dams to ensure the retention of tailings in case of a dam rupture.

Our de-characterization plan currently comprises 23 geotechnical structures built by the upstream raising method. We concluded the de-characterization of seven of the original 30 upstream structures between 2019 and 2021. In 2019, we concluded the de-characterization of the 8B dam in the city of Nova Lima. In 2020, we concluded the de-characterization of Rio do Peixe, II Kalunga and III Kalunga dikes. In 2021, we concluded the de-characterization of Ponges de Rejeitos dam, Fernandinho dam. We also concluded the de-characterization of dike 5 of Pontal and we are waiting the validation from the regulatory agency.

Our plan also includes the construction of six containment structures (back-up dams) for certain dams, to retain tailings in case of dam rupture, protecting the area downstream from these dams during the de-characterization works. Between 2020 and 2021, we concluded the construction of three downstream back-up dams, one for the Sul Superior dam, one for B3/B4 dam, and one for Forquilha I, Forquilha II, Forquilha III, Forquilha IV and Grupo dams. The construction of a back-up dam for the Pontal tailings and storage facilities is expected to be completed for the second half of 2022. We are currently working on defining the solutions to implement two other downstream back-up dams.

The engineering projects for our structures are under different stages of development. In the ones in the conceptual engineering phase, our provision was measured in accordance with market practices, taking into consideration the high degree of uncertainty in the definition of the total expenditures to execute the dam de-characterization projects.

We also operate tailings dams in Canada, including compacted outer shell upstream dams. We are not planning to de-characterize these upstream dams for the time being, since there are no safety, technical or regulatory reasons for doing so. All of our dams in Canada have been built in accordance with engineering standards of the Canadian Dam Association (CDA). Legacy dams that pre-date these standards are being upgraded accordingly through a comprehensive program of dam rehabilitation and buttressing. In Mozambique, our single tailings dam is no longer active, and a closure plan is currently at a conceptual stage.

Our joint venture Samarco owns two upstream tailings dams, both inactive and in compliance with the currently approved design. After the rupture of Samarco's dam in 2015, emergency works were performed in order to ensure the stability required and to comply with the applicable regulation. In February 2022, Samarco entered into an agreement (*termo de compromisso*) with the state of Minas Gerais, regulatory agencies and state and federal public prosecutors, establishing a new schedule and reinforcing the commitment to eliminate its upstream structures in Brazil. Samarco is currently implementing a closure plan and long-term monitoring will be defined as part of the de-characterization of both structures. Our investee Mineração Rio do Norte ("MRN") owns 24 tailings dams, 12 of which are active, while the other 12 are inactive. The two upstream dams in such portfolio are inactive and have ongoing de-characterization plans.

The de-characterization process is important for the long-term risk reduction of the upstream tailings facilities, but the works required for the de-characterization process may impact the geotechnical stability of certain upstream tailings facilities, increasing the risk of rupture of these structures especially during the first phases of this process. To mitigate this risk, we have evacuated the downstream zones of the critical dams and we are building big physical barriers (back-up dams) to contain the tailings in case of failure. To mitigate the risk of life losses, we are considering alternatives to perform the works in these critical dams with remotely operated equipment and the design is being reviewed with proper redundancy levels.

In 2021, we spent a total of US\$338 million in connection with the de-characterization of dams. As of December 31, 2021, we had a US\$3.523 billion provision recognized in our balance sheet for the de-characterization of upstream structures.

Governance measures - Independent Ad Hoc Advisory Committee to the Board of Directors. In April 2021, the Independent Ad Hoc Consulting Committee for Dam Safety "CIAE-SB", created immediately after the dam rupture, completed its work, and provided its final report to our Board of Directors. We continue with our work on dam safety, now conducted by the Independent Tailings Review Board (ITRB), composed by the former CIAE-SB members, among others, in line with the best international practices and with the Global Standard of the Tailings Management Industry – GISTM.

We have developed action plans to address all CIAE-SB recommendations, which are regularly assessed in a multiple layer system and delays must be justified and approved by senior leadership.

Monitoring and precautionary measures. We have been closely monitoring our active and inactive dams. Among other measures to improve our tailings and dam management system, we have dedicated teams with enhanced governance and revised processes and standards. We have created three geotechnical monitoring centers since 2019, to continuously monitor the dams and to collect information for better decision making. We have implemented 24-

hour video monitoring, emergency sirens, water level monitoring in different areas of dam and satellite and drone image and radar monitoring to complement the information from conventional instruments like piezometers, water level indicators, flowmeters etc. We have implemented the emergency sirens in the self-rescue zone of high consequence classification structures in Brazil and these sirens can be triggered by the automatic activation system or manually by the geotechnical monitoring center personnel.

Under applicable Brazilian federal regulations, we must submit to the authorities a certification of stability (Stability Condition Statement, or “DCE”) from an independent expert for each of our dams. For 103 of our geotechnical structures, the DCE must be submitted semi-annually, on March 31 and September 30 of each year. If we are unable to comply with safety requirements for issuance of the DCE of a certain dam, we need to take certain emergency actions based on the Emergency Action Plan for Mining Dam (“PAEBM”) for this dam, which may include the suspension of related operations, evacuation of the area surrounding the dam and removal of communities.

In January 2020, we implemented the function of “Engineer of Record” (“EoR”) for our iron ore business, responsible for carrying out regular dam safety inspections and performance assessment for each dam, as well as the issuance of monthly technical reports, in a model of continuous supervision. This is another line of defense for dam safety, under which if a change in the stability of any of our structures is identified, a new audit process may be initiated to issue or revoke a DCE at any moment. We have implemented continuous monitoring through an EoR in all 103 structures.

As of March 31, 2022, an EoR issued DCEs for 103 structures (95 structures in our ferrous minerals operations and 8 in our base metals operations). We did not obtain positive DCEs for 30 structures (all of them in our ferrous minerals operations).

Additional information on the status of DCEs and emergency levels of our structures is available on our ESG Portal, at www.vale.com/esg. Information in our website is not incorporated by reference in this annual report on Form 20-F.

Review of our active and inactive mining sites. We are reviewing our active and inactive mining sites to improve geotechnical management and ensure compliance with applicable rules. As part of our ongoing review of our mining sites, we may identify other structures that should be classified as dams under applicable regulations, which may trigger additional obligations or precautionary measures. These measures could impact our production, cause the suspension of operations and generate additional costs, which could materially and adversely affect our business.

Settlement agreements

We have been actively seeking non-judicial alternatives to promote a more expedited reparation and remediation to the impacted people and to settle the various legal proceedings relating to the Brumadinho dam rupture. Below is a summary of key settlement agreements we have entered so far.

Integral Reparation Agreement. On February 4, 2021, we entered into a court-supervised settlement agreement with the Government of the State of Minas Gerais, the Public Defender Office of the State of Minas Gerais (*Defensoria Pública de Minas Gerais*), public prosecutors of the State of Minas Gerais (*Ministério Público do Estado de Minas Gerais—“MPMG”*) and federal prosecutors (*Ministério Público Federal—“MPF”*) for the reparation and remediation of socio-environmental and social-economic damages resulting from the Brumadinho dam rupture (the “Integral Reparation Agreement”). This agreement was mediated by the Court of Appeals of the State of Minas Gerais.

- Under the Integral Reparation Agreement, we agreed on several socio-economic and socio-environmental reparation projects. The agreement includes our obligations to (i) fund certain agreed socio-economic and socio-environmental projects that will be managed by the State of Minas or by the courts, subject to a fixed disbursement schedule of predefined amounts, and (ii) implement directly certain projects established in the Integral Reparation Agreement. The estimated economic value of the Integral Reparation Agreement is R\$37.7 billion, which includes: (i) disbursements made prior to the settlement date of scope similar to the agreement, in an amount of R\$7.8 billion; (ii) disbursements required for implementation of projects to be managed by the authorities, for a total specified amount of R\$19.2 billion; (iii) estimated costs of the socio-economic

reparation projects to be directly implemented by us, subject to a cap of R\$5.7 billion; and (iv) estimated costs of R\$5 billion for certain environmental recovery projects (*Plano de Reparação Ambiental*) to be implemented by us, and which are not subject to a cap to our commitments.

- Projects contemplated in the agreement are aligned with our Full Reparation Program, and include (i) projects demanded by the affected communities, (ii) a program of income transfer to the impacted population, replacing the current payment of emergency aid, (iii) projects for the city of Brumadinho and for the other municipalities of the Paraopeba Basin, (iv) funding for the Government of the State of Minas Gerais to implement an urban mobility program and (v) a public service strengthening program.
- This agreement settles the majority of requests made in certain public civil actions in which public authorities sought damages and a wide range of injunctive measures against us as a result of the Brumadinho dam rupture. Part of our commitments under the agreement were settled with the release, for the benefit of the authorities, of judicial deposits we had made, to be used in the implementation of projects under the Settlement Agreement. Individual claims for severable damages are excluded from the Integral Reparation Agreement. See —*Other settlement agreements below and Additional Information—Legal proceedings*.
- We will be discharged of the obligations established in the Integral Reparation Agreement upon (a) the full payment of our financial commitments, in accordance with the amounts and payment schedule defined for the projects managed by the State of Minas Gerais and judicial authorities, and (b) the conclusion by Vale of the projects to be implemented directly by us, which mainly include socio-economic and environmental repair projects.
- The Integral Reparation Agreement also establishes guidelines for the governance and implementation of the Full Reparation Program.

In November 2021, the government of the state of Minas Gerais conducted a public consultation with the residents of the 26 municipalities affected by the dam failure. Affected people were able to indicate priority areas for investments in socio-economic repair projects in their cities. As a result of the Integral Reparation Agreement and based on our cash outflow expectations, we have a provision in the amount of US\$2.984 billion as of December 31, 2021. For a discussion of the impacts of the dam rupture on our business and operations, see *Overview—Risk factors—Risks relating to dam rupture* and see *Operating and Financial Review and Prospects—Overview—Tailings dam rupture in Brumadinho*.

Other settlement agreements. We have entered into other settlement agreements with public authorities to establish the framework for individual indemnification of the victims, in addition to individual settlement agreements with the victims.

February 2019 preliminary settlement agreement. In February 2019, we entered into a preliminary settlement agreement with the state of Minas Gerais and other public authorities pursuant to which we committed to make monthly emergency aid payments to residents of Brumadinho and certain communities located downstream of the dam from January 2019 through October 2021. As of October 2021, the total amount paid as emergency aid was approximately R\$2.3 billion, and these amounts were recognized within the R\$37.7 billion Integral Reparation Agreement. Also under the Integral Reparation Agreement, we provided R\$4.4 billion to the income transfer program that has replaced the monthly emergency aid payments. This program will be administered and operated by judicial institutions.

April 2019 preliminary settlement agreement with Minas Gerais state public defenders. In April 2019, we entered into an agreement with the public defenders' office of the state of Minas Gerais to establish the framework for out-of-court settlement agreements for damage claims for property and other economic and moral damages (*danos morais*). As of March 31, 2022, we had entered into more than 5,100 indemnification agreements with over 10,400 individuals affected by the dam rupture and evacuations, providing for payments in the aggregate amount of approximately R\$1.8 billion. These standards were also used to determine indemnification payments in other municipalities where evacuations occurred as result of the elevation of the emergency level of certain dams.

Settlement agreement with public labor prosecutors and labor unions. In July 2019, we entered into a settlement agreement with the public labor prosecutors to indemnify relatives of the victims of the dam rupture. As of March 31, 2022, we had entered into more than 694 indemnification agreements with individuals or groups pursuant to this settlement agreement, providing for payments to at least one member of the family of each of 250 deceased workers, in the aggregate amount currently exceeding R\$1.1 billion. In March 2020, we entered into a settlement agreement with labor unions, setting forth the indemnification amount to be paid to survivor workers and workers based on the Córrego do Feijão and Jangada Mines. As of March 31, 2022, we had entered into more than 773 indemnification agreements with individuals or groups pursuant to this settlement agreement, providing for payments in the aggregate amount of approximately R\$108 million.

In July 2021, we entered into a settlement agreement in which we committed to pay indemnification to the family units of deceased employees in connection with the extinction of their employment contracts. The settlement was also extended to provide indemnification to the family units of deceased outsourced workers.

Agreement with Minas Gerais state public defenders. On March 4, 2021, we signed an agreement (*termo de compromisso*) with the public defender's office of the state of Minas Gerais, to regulate and establish comprehensive criteria for the payment of indemnification to the people that were impacted by the evacuation that occurred in the community of São Sebastião das Águas Claras (Macacos) in the municipality of Nova Lima, due to the rise in the emergency level of B3/B4 dam.

Other agreements. We have entered into other agreements with authorities to cover specific topics, such as support to the municipalities in providing public services and infrastructure, emergency payments to the indigenous communities, specific remediation and compensation measures, external audits and asset integrity studies, provision of technical support for the authorities, with measures to review and reinforce structures and suspension of operations.

Other legal proceedings and investigations relating to the Brumadinho dam rupture continue, and new investigations and legal proceedings may be brought in the future. See *Additional Information—Legal proceedings*.

Cultural transformation

In 2019, we began a deep process of cultural transformation which seeks to promote culture as a facilitator of our strategy and ambitions for the next five years: be recognized by society as an industry reference in safety, the best and most reliable operator, talent-oriented, a leader in sustainable mining, and a benchmark in creating and sharing value.

By December 2021, we had made progress on several initiatives in order to promote our cultural transformation:

- A long-term global communication strategy was implemented in 2021.
- Increased focus on leadership, with sessions held with the Executive Committee in addition to culture and purpose activation sessions, impacting more than 90% of the organization's leadership.
- Transformation programs tailored to each business unit.
- Progress in the implementation of the Vale Management System (VPS) with consolidation of the implementation plan in 57 sites (main business areas).
- Expansion of influencers with the creation of the Purpose Guardian group.
- Consolidation of the Echoes Pulse survey to measure the evolution of key employee behaviors.
- Definition of the five attributes expected for leadership – Safety and Risk, a Growth Mindset, People Development, a Business Vision, and Sustainability.
- More than 600 leaders completed the development program focusing on key expected behaviors.

RESPONSES TO THE RUPTURE OF SAMARCO'S TAILINGS DAM IN MINAS GERAIS

In November 2015, the Fundão tailings dam owned by Samarco ruptured, releasing tailings downstream, flooding certain communities and causing impacts on communities and the environment along the Doce river. The rupture resulted in 19 fatalities and caused property and environmental damage to the affected areas. Samarco is a joint venture equally owned by Vale S.A. and BHP Billiton Brasil Ltda. ("BHPB").

In June 2016, Samarco, Vale and BHPB, in agreement with public authorities, created Fundação Renova, a not-for-profit private foundation, to develop and implement (i) social and economic remediation and compensation programs and (ii) environmental remediation and compensation programs in the region affected by the dam rupture. Fundação Renova has been implementing 42 remediation programs established under the settlement agreements entered into with public authorities, following the governance mechanisms established in these settlement agreements.

In August 2020, we announced the "*Agenda Integrada*" program, a settlement agreement among Fundação Renova, the states of Minas Gerais and Espírito Santo and an association of mayors of cities along the Doce river, providing for the allocation of R\$882 million to investments in education, infrastructure, and health in the region impacted by the rupture of the Samarco dam.

In July 2020, the 12th Federal Court in Belo Horizonte issued a decision providing guidelines for compensation to be paid to residents of the city of Baixo Guandu, followed by other decisions setting simplified parameters for the compensation of workers (mainly informal workers whose activities are difficult to legally demonstrate), in at least 35 cities and villages in the states of Minas Gerais and Espírito Santo. These parameters have been reflected throughout other cities along the Doce river, following a court decision issued on October 30, 2021. For more information see: <http://www.vale.com> (under English Version/Investors/ESG Portal/Reparation/Renova Foundation). Information on our website is not incorporated by reference in this annual report on Form 20-F.

The resettlement project progressed in 2021. Of the approximately 600 caseloads planned for the restitution of the right to housing in the resettlement process, 107 were completed. In the Bento Rodrigues collective resettlement, the infrastructure is close to completion, and includes a school, a health unit, a service station, a sports court and a sewage treatment plant, in addition to other infrastructure works such as street lighting and paving. Additionally, 47 houses were built, 42 of which in 2021 and 5 in 2020. In the Paracatu de Baixo collective resettlement, about 93% of the infrastructure was completed, such as access and drainage, in addition to having started the construction of the school and 11 houses in 2021. In the Family Resettlement, a modality where the family can choose a property in the surroundings to live or even a plot of land to build their new home on, by 2021, 36 houses were delivered, 29 of which were new constructions (5 by 2020 and 24 in 2021) and 7 were rebuilt houses (6 by 2020 and 1 by 2021). About Gesteira, by 2021, 29 letter of credit processes were approved (similar to family resettlement), 2 of which by 2020 and 27 in 2021. 10 families had their right to housing restored through Pecuniary payments, 1 of which by 2020 and 9 in 2021. In the Pecuniary modality, the affected people, within their liberality and keeping all their rights, ask for a pecuniary payment of the amount equivalent to their housing right.

The resettlements of Bento Rodrigues and Paracatu de Baixo were developed through listening to those affected and respecting old neighborhood relations, with housing projects defined by the residents and all necessary infrastructure and public goods. Through these hearings, those affected participated, from the choice of land for the resettlement to the material used to finish their houses, in line with the best international references. Until the delivery of the properties, the resettlement public can reside in temporary housing, where all maintenance and habitability guarantee costs are borne by Fundação Renova, as well as transportation to temporary schools and leisure and integration activities. The original cultural manifestations of the affected villages are encouraged and their continuity is also guaranteed by Fundação Renova, which promotes various actions with the aim of keeping these activities alive and strengthened.

By 2021, more than 363,000 people along the Doce River basin had received R\$8.71 billion in total indemnities and Emergency Financial Aid (AFEs) paid. Of this total, more than 51,800 people along the Rio Doce basin received R\$5.1 billion in compensation paid via the Simplified Indemnity System, which was implemented in 2020 and extended through a court decision to all locations along the Rio Doce and impacted estuarine regions. The year 2021 also marked

the conclusion of reparation agreements, including compensation, with the indigenous communities of Espírito Santo, comprising the Comboios, Caieiras Velhas II and Tupiniquim Indigenous Lands, benefiting 1,653 family nuclei. The agreements with the indigenous people were built together with the communities, respecting the self-determination of the peoples and the due process of consultation. In addition to family compensation, the negotiation included the creation of a program to support the resumption of economic activities and the creation of a fund for compensation for immaterial and collective damages. An agreement was also signed with the Quilombola Community of Degredo, which has also been receiving individual compensation and its Basic Environmental Plan will be, at the request of the community itself, executed by the Local Community Association that also acts as Technical Advisor, strengthening the autonomy of the community.

For a discussion of the funding of Fundação Renova and the impact on our financial statements, see *Operating and Financial Review and Prospects—Overview—Fundação Renova and Samarco Funding*. For a discussion of the legal proceedings resulting from the rupture of Samarco's tailings dam, the settlement agreements we entered into with public authorities and the creation of Fundação Renova, see *Additional Information—Legal proceedings*. For further information on the actions taken by Fundação Renova, see <http://www.vale.com> (under English Version/Investors/ESG Portal/Reparation/Renova Foundation). Information on our website is not incorporated by reference in this annual report on Form 20-F.

Since the rupture of the Fundão dam, Samarco has been subject to extensive litigation and in a situation of financial distress. Samarco has defaulted under a number of financing agreements and, in April 2021, Samarco filed for Judicial Reorganization with the 2nd State Court for Corporate Matters of Belo Horizonte, to restructure, among other debts, its financial debt. See *Overview—Risk factors—Legal, Political, Economic, Social and Regulatory Risks— Legal proceedings and investigations could have a material adverse effect on our business and Information on the Company— Lines of Business—Other Investments—Other—Samarco*.

FORWARD-LOOKING STATEMENTS

This annual report contains statements that may constitute forward-looking statements within the meaning of the safe harbor provisions of the U.S. Private Securities Litigation Reform Act of 1995. Many of those forward-looking statements can be identified by the use of forward-looking words such as “anticipate,” “believe,” “could,” “expect,” “should,” “plan,” “intend,” “estimate” and “potential,” among others. Those statements appear in a number of places and include statements regarding our intent, belief or current expectations with respect to:

- the impact of the rupture of the tailings dam in Brumadinho in 2019, the rupture of Samarco’s tailings dam in 2015, and related remediation measures on our operations, cash flows and financial position;
- the implementation of our dam de-characterization plan;
- the outcome of the various investigations, regulatory, governmental, uncertain tax treatments and legal proceedings in which we are involved;
- the impact of the ongoing war in Ukraine and the economic sanctions imposed on Russia, and their impact on the global economy, which are highly uncertain and difficult to predict;
- the duration and severity of the coronavirus (COVID-19) outbreak and its impacts on our business;
- our direction and future operation;
- the implementation of our financing strategy and capital expenditure plans;
- the exploration of mineral reserves and resources and development of mining facilities;
- the depletion and exhaustion of mines and mineral reserves and resources;
- trends in commodity prices, supply and demand for commodities;
- the future impact of competition and regulation;
- the payment of dividends or interest on shareholders’ equity;
- compliance with financial covenants;
- industry trends, including the direction of prices and expected levels of supply and demand;
- the implementation of our principal operating strategies, including our potential participation in acquisition, divestiture or joint venture transactions or other investment opportunities;
- our ability to comply with our ESG targets and commitments;
- other factors or trends affecting our financial condition or results of operations; and
- the factors discussed under *Overview—Risk factors*.

We caution you that forward-looking statements are not guarantees of future performance and involve risks and uncertainties. Actual results may differ materially from those in forward-looking statements as a result of various factors. These risks and uncertainties include factors relating to (i) economic, political and social issues in the countries in which we operate, including factors relating to the coronavirus pandemic outbreak, (ii) the global economy, (iii) commodity prices, (iv) financial and capital markets, (v) the mining and metals businesses, which are cyclical in nature, and their dependence upon global industrial production, which is also cyclical, (vi) regulation and taxation, (vii) operational incidents or accidents, and (viii) the high degree of global competition in the markets in which we operate. For additional information on factors that could cause our actual results to differ from expectations reflected in forward-looking statements, see *Overview—Risk factors*. Forward-looking statements speak only as of the date they are made, and we do not undertake any obligation to update them in light of new information or future developments. All forward-looking statements attributed to us or a person acting on our behalf are expressly qualified in their entirety by this cautionary statement, and you should not place undue reliance on any forward-looking statement.

RISK FACTORS

RISKS RELATING TO DAM RUPTURE

The rupture of a dam or other geotechnical structure may cause severe damages, including personal, property and environmental damages.

We own a significant number of dams and other geotechnical structures. Some of these structures were built using the “upstream” raising method, which may present higher stability risks, especially related to liquefaction. The rupture of any of these structures could cause loss of life and severe personal, property and environmental damages, as well as negative social impact, and could have adverse effects on our business and reputation, as evidenced by the consequences of the dam rupture in Brumadinho and Samarco’s dam in Mariana. Some of our joint ventures and investees, including Samarco and Mineração Rio do Norte S.A. (MRN), also own dams and similar structures, including structures built using the upstream raising method.

Laws and regulations approved in Brazil following the rupture of Brumadinho dam require us to de-characterize all our upstream dams on a specified timetable. Due to the technical complexity involved in the de-characterization works and the necessary actions to increase safety of the structures, in February 2022, we have entered into an agreement (*termo de compromisso*) with the state of Minas Gerais, regulatory agencies and state and federal public prosecutors, establishing a new schedule and reinforcing the commitment to eliminate all upstream structures in Brazil. We are still determining the appropriate measures for the de-characterization of certain upstream dams in Brazil.

As of the date hereof, we have concluded approximately 23% of our de-characterization plan. This means that these structures have lost their upstream characteristics and no longer have the function of storing tailings. The elimination of 100% of the dams is expected to be achieved by 2035, given the dams technical characteristics, such as volumes of tailings contained. Additional information relating to such timelines is available on our ESG Portal, at www.vale.com/ESG. Information in our website is not incorporated by reference in this annual report on Form 20-F. The implementation of the de-characterization plan will require significant expenditures, and the de-characterization process may take a long time. As of December 31, 2021, our provision for the conclusion of the de-characterization plan of our structures is US\$3.523 billion and of Samarco’s structure is US\$202 million, and additional provisions may be recognized as a result of adjustments to the de-characterization projects.

The works related to the de-characterization process may impact the geotechnical behavior of certain upstream tailings facilities, affecting the risk of rupture of these structures. In extreme cases, this process, when associated with other conditions, may contribute to the rupture of structures. The evacuation of the downstream zones of the critical dams, the construction of physical barriers (back-up dams) to contain the tailings in case of failure and other safety measures we take may not be sufficient to prevent damages and impact on communities.

The rupture of our tailings dam in Brumadinho has adversely affected our business, financial condition and reputation, and the overall impact of the dam rupture on us is still uncertain.

In January 2019, the dam rupture in Brumadinho resulted in 270 fatalities or presumed fatalities, in addition to personal, property and environmental damages. See *Overview—Business overview— Responses to the rupture of the tailings dam in Brumadinho*. This event has adversely affected and will continue to adversely affect our operations.

- *Liabilities and legal proceedings.* We continue to be a defendant in a number of legal proceedings and investigations related to the dam rupture, including criminal investigations in Brazil and securities litigation in the United States. Additional proceedings and investigations may be initiated in the future. Adverse results in these proceedings may have a material adverse effect on our business and financial condition. See *Overview—Business overview— Responses to the rupture of the tailings dam in Brumadinho* and *Additional Information—Legal proceedings*.

- *Suspension of operations.* Following the dam rupture, we have suspended various operations, which have adversely impacted and may continue to adversely impact our production and cash flows. It is possible that certain of these operations may not be resumed. In addition, orders by the relevant authorities or courts may result in substantial operational inefficiencies, which may lead to the suspension of certain operations. See *Operating and Financial Review and Prospects—Tailings dam rupture in Brumadinho*.
- *Impact on our financial performance.* The dam rupture continues to have a significant impact on our financial performance, which include reduced revenues due to the suspension of operations, increased expenditures for assistance and remediation, impairments of fixed assets, provisions for costs of de-characterization, restoration and recovery, and provisions for legal proceedings. See *Operating and Financial Review and Prospects—Overview—Tailings dam rupture in Brumadinho*.
- *Increase in production costs and capital investments.* We have made investments and adjustments in our operations and may need to make additional investments and adjustments to increase production, mitigate the impact of suspended operations or comply with additional safety requirements. We may also have to use alternative disposal methods to continue operating certain mines and plants, particularly those that rely on tailings dams. These alternative methods may be more expensive or require significant capital investments in our mines and plants. As a result, we expect our costs to increase, which may have a material adverse effect on our business and financial condition.
- *Additional regulation and restrictions on mining operations.* Rules on mining activities and ancillary activities, such as dam safety, have become stricter following the Brumadinho dam rupture. Additional rules may be approved. The licensing process for our operations has become longer and subject to more uncertainties. Also, external experts may be reluctant to attest to the stability and safety of our dams, as a result of increasing risks of liability. If any of our dams is unable to comply with the safety requirements or if we are unable to obtain the required certification for any of our dams, we may need to suspend operations, evacuate the area surrounding this dam, relocate communities and take other emergency actions. These measures are costly, may adversely impact our business and financial condition and may cause further damage to our reputation.
- *Additional environmental impacts.* The entire environmental consequences of the Brumadinho dam rupture remain uncertain, and additional damages may be identified in the future. Also, failure to implement our de-characterization plan and measures to prevent further accidents could also lead to additional environmental damages, additional impacts on our operations, and additional claims, investigations and proceedings against us.
- *Reserves and resources.* New regulations applicable to dam licensing and operations have caused, and may further cause, decreases in our reported reserves and resources or reclassification of proven reserves as probable reserves.
- *Increased cost of insurance.* Our cost of insurance may rise, and we may not be able to obtain insurance for certain risks.
- *Increased taxation and other obligations.* We may be subject to new or increased taxes or other obligations to fund remediation measures and compensate direct and indirect impacts of dam ruptures.

EXTERNAL RISKS

Geopolitical tensions and military hostilities, including the ongoing military conflict between Russia and Ukraine, and the economic sanctions imposed as a result of such conflicts may materially adversely impact our business

Our business is subject to external risk factors related to our global operations and the global profile of our client portfolio and supply chains. U.S. and global markets are experiencing volatility and disruption following the escalation of geopolitical tensions, in particular, in connection with the military conflict between Russia and Ukraine.

The resulting economic sanctions imposed by the United States, the European Union, the UK and other countries as a direct consequence of this conflict may continue to significantly impact supply chains, lead to market disruptions including significant volatility in commodities' prices, and bring heightened near-term uncertainty to the global financial system, including through instability of credit and of capital markets. These factors may have impacts on our production and sales, result in additional costs and expenses, and eventually adversely impact our financial conditions or results of operations.

Escalation of the Russia-Ukraine conflict could lead to other additional impacts which may adversely affect our business, such as disruption of international trade flows, extreme market pricing volatility, with particular impact on the energy sector, industrial and agricultural supply chains, shipping, and regulatory and contractual uncertainty, and increased geopolitical tensions around the world. These factors could disrupt the global markets in ways that are difficult to predict and estimate in advance as to their potential impact on our business, financial position, or operational results.

Our business is exposed to the cyclicity of global economic activity and requires significant investments of capital

As a mining company, we are a supplier of industrial raw materials. Industrial production is cyclical and volatile, which affects demand for minerals and metals. At the same time, investment in mining requires a substantial amount of funds in order to replenish reserves and resources, expand and maintain production capacity, build infrastructure, preserve the environment, prevent fatalities and occupational hazards and minimize social impacts. Sensitivity to industrial production, together with the need for significant long-term capital investments, are important sources of risk for our financial performance and growth prospects.

We may not be able to adjust production volume in a timely or cost-efficient manner in response to changes in demand. Lower utilization of capacity during periods of weak demand may expose us to higher unit production costs since a significant portion of our cost structure is fixed in the short-term due to the capital intensity of mining operations. In addition, efforts to reduce costs during periods of weak demand could be limited by labor regulations or previous labor or government agreements. Conversely, during periods of high demand, our ability to rapidly increase production capacity is limited, which could prevent us from meeting demand for our products. We may be unable to complete expansions and greenfield projects in time to take advantage of rising demand for iron ore, nickel or other products. When demand exceeds our production capacity, we may meet excess customer demand by purchasing iron ore fines, iron ore pellets or nickel from third parties processing and reselling it, which would increase our costs and narrow our operating margins. If we are unable to satisfy excess customer demand in this way, we may lose customers. In addition, operating close to full capacity may expose us to higher costs, including demurrage fees due to capacity restraints in our logistics systems.

The prices for our products are subject to volatility, which may adversely affect our business.

Global prices for metals are subject to significant fluctuations and are affected by many factors, including actual and expected global macroeconomic and political conditions, regional and sectorial factors, levels of supply and demand, the availability and cost of substitutes, inventory levels, technological developments, regulatory and international trade matters, investments by commodity funds and others and actions of participants in the commodity markets. Sustained low market prices for the products we sell may result in the suspension of certain of our projects and operations, decrease in our mineral reserves and resources, impairment of assets, and may adversely affect our cash flows, financial position and results of operations. We expect that the price of our products may be subject to additional volatility in 2022 due to the continuous impact of the COVID-19 pandemic, the withdrawal of governmental benefits and relief measures, geopolitical risk, and other macroeconomic factors.

Demand for our iron ore and nickel products depends on global demand for steel. Iron ore and iron ore pellets, which together accounted for 84% of our 2021 net operating revenues from continuing operations, are used to produce carbon steel. Nickel, which accounted for 6.0% of our 2021 net operating revenues from continuing operations, is used

mainly to produce stainless and alloy steels. The prices of different steel products and the performance of the global steel industry are highly cyclical and volatile, and these business cycles in the steel industry affect demand and prices for our products. In addition, vertical backward integration of the steel and stainless steel industries and the use of scrap could reduce the global seaborne trade of iron ore and primary nickel. The demand for copper is affected by the demand for copper wire, and a sustained decline in the construction industry could have a negative impact on our copper business. Copper products accounted for 4.8 % of our 2021 net operating revenues from continuing operations.

We are mostly affected by movements in iron ore prices. For example, a price reduction of US\$1 per dry metric ton unit (“dmt”) in the average iron ore price would have reduced our operating income for the year ended December 31, 2021 by approximately US\$310 million. Average iron ore prices significantly changed in the last five years, from US\$71.32 per dmt in 2017, US\$69.49 per dmt in 2018, US\$93.40 per dmt in 2019, US\$108.87 per dmt in 2020 and US\$159.49 per dmt in 2021, according to the average Platts IODEX (62% Fe CFR China). On March 10, 2022, the year-to-date average Platts IODEX iron ore price was US\$139.55 per dmt. See *Operating and Financial Review and Prospects—Overview—Major factors affecting prices*.

Adverse economic developments in China could have a negative impact on our revenues, cash flow and profitability.

China has been the main driver of global demand for minerals and metals over recent decades. In 2021, Chinese demand represented 74% of global demand for seaborne iron ore, 56% of global demand for nickel and 52.5% of global demand for copper. The percentage of our net operating revenues attributable to sales to customers in China was 52% in 2021. Therefore, any contraction of China’s economic growth or change in its economic profile, or changes in the political or sanctions environment globally could result in lower demand for our products, leading to lower revenues, cash flow and profitability. Underperformance in the Chinese real estate and infrastructure sectors, the largest consumer of carbon steel in China, would also negatively impact our results. The COVID-19 pandemic control measures, such as shutdowns resulting from localized outbreaks, could potentially impact the industrial activity and supply chain.

Development of new battery technologies using less nickel may impact the demand of our nickel products.

Global demand for metal for batteries is subject to evolving battery chemistry technologies, which are affected by many factors, including cost, performance, safety, material availability, and consumer preferences, as well as governmental regulation. Sustained production and consumption of non-nickel battery chemistries from end-use demand markets could result in lower nickel demand, reduced prices, postponements of certain projects, and a decrease in production levels. Competitive products in the market have existed for years and with end-use customers, particularly electric vehicle OEMs, increasingly adopting a broad and efficient portfolio of battery chemistries, new battery technologies could overtake current technologies, including nickel-based chemistries, having a negative impact in our nickel business.

Changes in exchange rates for the currencies in which we conduct operations could adversely affect our financial condition and results of operations.

A substantial portion of our revenues, trade receivables and debt is denominated in U.S. dollars, and given that our functional currency is the Brazilian *real*, changes in exchange rates may result in (i) losses or gains on our net U.S. dollar-denominated indebtedness and accounts receivable and (ii) fair value losses or gains on currency derivatives we use to stabilize our cash flow in U.S. dollars. In 2021, we had net foreign exchange gains of US\$408 million vs. net foreign exchange losses of US\$549 million in 2020. In addition, changing values of the Brazilian *real*, the Canadian dollar, the Indonesian rupiah, the Chinese *yuan* and other currencies against the U.S. dollar affects our results since most of our costs of goods sold is denominated in currencies other than the U.S. dollar, principally the *real* (40.8% in 2021) and the Canadian dollar (5.9% in 2021), while our revenues are mostly U.S. dollar-denominated. We expect currency fluctuations to continue to affect our financial income, expense and cash flow generation.

As of April 1, 2022, the U.S. dollar commercial selling rate published by the Central Bank was R\$4.6643 per US\$1.00, which represents a 16.4% decrease as compared to the selling rate of R\$5.5805 per US\$1.00 as of December 31, 2021. Significant volatility in currency prices, among other factors, may also result in disruption of foreign exchange markets,

which could limit our ability to transfer or to convert certain currencies into U.S. dollars and other currencies for the purpose of making timely payments of interest and principal on our indebtedness. The central banks and governments of the countries in which we operate may institute restrictive exchange rate policies in the future and impose taxes on foreign exchange transactions.

Development of new decarbonization technologies using lower grade ores may increase the demand for low grade iron ore and could impact the premium and demand of our iron ore products.

The demand and premium of our iron ore products are defined by the value-in-use and demand for such products by the steel industry according to the existing steel production routes. Given the decarbonization challenge, new decarbonization technologies and production routes are being developed. Successful development of new technologies that allow the use of lower grade ores or ores with higher level of impurities in more competitive conditions may reduce the relative value-in-use of our higher-grade material, and the large adoption of such technologies by the steel industry may have a negative impact on the demand and premium of our iron ore products.

FINANCIAL RISKS

Lower cash flows, resulting from suspension of operations or decreased prices of our products, may adversely affect our credit ratings and the cost and availability of financing.

The suspension of operations or a decline in the prices of our products may adversely affect our future cash flows, credit ratings and our ability to secure financing at attractive rates. It may also negatively affect our ability to fund our capital investments, including disbursements required to remediate and compensate damages resulting from the dam rupture in Brumadinho, provide the financial assurances required to obtain licenses in certain jurisdictions, pay dividends and comply with the financial covenants in some of our long-term debt instruments. See *Operating and Financial Review and Prospects—Liquidity and capital resources*.

Uncertainties relating to the discontinuation and replacement of LIBOR may adversely affect us.

In July 2017, the United Kingdom Financial Conduct Authority (FCA), which regulates the London Interbank Offered Rate (“LIBOR”), announced the effective discontinuation of LIBOR. Since December 31, 2021, the FCA no longer requires panel banks to submit quotes for LIBOR settings other than overnight and 12-month U.S. dollar LIBOR and, after June 30, 2023, the FCA will no longer require panel banks to submit quotes for any U.S. dollar LIBOR settings. We are currently evaluating the potential impact of the eventual replacement of LIBOR interest with a dedicated multidisciplinary working group. As of the date hereof, it is not possible to predict the effect of the discontinuation of LIBOR or its replacement by alternative reference rates or of any other reforms to LIBOR that may be enacted in the United Kingdom or elsewhere. Uncertainty related to the discontinuation, as to the nature of alternative reference rates and as to potential changes or other reforms to LIBOR may have an adverse effect on our financial condition and results of operations. As of December 31, 2021, approximately 30% of our financial debt was referenced to LIBOR. Our financial contracts that are referenced to LIBOR have fallback language for LIBOR discontinuation.

LEGAL, POLITICAL, ECONOMIC, SOCIAL AND REGULATORY RISKS

Legal proceedings and investigations could have a material adverse effect on our business.

We are involved in legal proceedings in which adverse parties have sought injunctions to suspend certain of our operations or claimed substantial amounts against us. Under Brazilian law, a broad range of conduct that could be considered to be in violation of Brazilian environmental, labor or tax laws can be considered criminal offenses. Accordingly, our executive officers, employees and, in certain cases, we and our subsidiaries could be subject to criminal investigations and criminal proceedings in connection with allegations of violation of environmental, labor or tax laws, and we or our subsidiaries could be subject to criminal investigations and criminal proceedings in connection with allegations of violation of environmental laws and human rights.

Defending ourselves in these legal proceedings may be costly and time consuming. Possible consequences of adverse results in some legal proceedings include suspension of operations, payment of significant amounts, triggering of creditor remedies and damage to our reputation, which could have a material adverse effect on our results of operations or financial condition. See *Additional Information—Legal proceedings*.

In addition to the investigations and legal proceedings relating to the Brumadinho dam failure, as a shareholder of Samarco, we also face the consequences of the failure of the Fundão tailings dam in November 2015. We are involved in multiple legal proceedings and investigations relating to the rupture of the Fundão tailings dam. Tax authorities or other creditors of Samarco may attempt to recover from us amounts due by Samarco, if Samarco is unable to fulfill its obligations or is unable to restructure its debt. Failure to contain the remaining tailings in Samarco's dams could cause additional environmental damages, additional impacts on our operations, and additional claims, fines and proceedings against Samarco and against us. We have been funding Fundação Renova to support certain remediation measures undertaken by Samarco. If Samarco is unable to generate sufficient cash flows to fund the remediation measures required under these agreements, we will be required to continue funding these remediation measures. See *Overview—Business overview—Responses to the Rupture of Samarco's tailings dam in Minas Gerais*. See *Additional Information—Legal proceedings*.

Political, economic and social conditions in the countries in which we have operations projects, customers or suppliers, could adversely impact our business.

Our financial performance may be negatively affected by regulatory, political, economic and social conditions in countries in which we have significant operations or projects. In many of these jurisdictions, we are exposed to various risks such as political instability, bribery, cyber-attacks, extortion, corruption, robbery, sabotage, kidnapping, civil strife, human rights violation, acts of war, guerilla activities, piracy in international shipping routes and terrorism. These issues may adversely affect the economic and other conditions under which we operate in ways that could have a materially negative effect on our business.

In Brazil, where a significant part of our operations is concentrated, the federal government's economic policies may have important effects on Brazilian companies, including us, and on market conditions and prices of securities of Brazilian companies. Our financial condition and results of operations may be adversely affected, for instance, by the following factors and the Brazilian federal government's response to these factors:

- exchange rate movements and volatility;
- inflation and high interest rates;
- financing of the current account deficit;
- liquidity of domestic capital and lending markets;
- tax policy;
- pension, tax and other reforms;
- political instability resulting from allegations of corruption involving political parties, elected officials or other public officials; and
- other political, diplomatic, social and economic developments in or affecting Brazil.

Historically, the country's political situation has influenced the performance of the Brazilian economy, and political crises have affected the confidence of investors and the general public, which resulted in economic deceleration, downgrading of credit ratings of the Brazilian government and Brazilian issuers, and heightened volatility in the securities issued abroad by Brazilian companies. Political instability may aggravate economic uncertainties in Brazil and increase volatility of securities of Brazilian issuers. Future economic, social and political developments in Brazil may impair our business, financial condition or results of operations, or cause the market value of our securities to decline.

Our governance, internal controls and compliance processes may fail to prevent breaches of legal, regulatory accounting, ethical or governance standards.

We operate in a global environment, and our activities extend over multiple jurisdictions and complex regulatory frameworks, with increasing enforcement activities worldwide. We are required to comply with a wide range of laws and regulations in the countries where we operate or do business, including anti-corruption, international sanctions, anti-money laundering and related laws and regulations. Our governance and compliance processes, which include the review of internal control over financial reporting, may not timely identify or prevent future breaches of legal, regulatory, accounting, governance or ethical standards. We may be subject to breaches of our code of conduct, anti-corruption policies, human rights policies or other internal policies, or breaches of business conduct protocols and to instances of fraudulent behavior, corrupt practices and dishonesty by our employees, contractors or other agents. This risk is heightened by the fact that we have a large number of contracts with local and foreign suppliers, as well as by the geographic distribution of our operations and the wide variety of counterparties involved in our business. Our failure to comply with applicable laws and other standards could subject us to investigations by authorities, litigation, fines, loss of operating licenses, disgorgement of profits, involuntary dissolution and reputational harm.

Disagreements with local communities could adversely impact our business and reputation.

Disputes with communities where we operate may arise from time to time. Accidents or incidents involving mines, industrial facilities and related infrastructure, such as the rupture of the tailings dam in Brumadinho, may significantly impact the communities where we operate. In some instances, our operations and mineral reserves and resources are located on or near lands owned or used by indigenous peoples or other groups of stakeholders. Some of our mining and other operations are located in territories where title may be subject to disputes or uncertainties, or in areas claimed for agriculture or land reform purposes, which may lead to disagreements with landowners, organized social movements, local communities and the government. In some jurisdictions, we may be required to consult and negotiate with these groups as part of the process to obtain licenses required to operate, to mitigate impact on our operations or to obtain access to their lands. Disagreements or disputes with local communities and groups, including indigenous peoples, organized social movements and local communities, could cause delays in obtaining licenses, increases in planned budget, delays or interruptions to our operations. These issues may adversely affect our reputation or hamper our ability to develop our reserves and resources and conduct our operations. In addition, difficulties in the engagement with stakeholders in social, environmental, and health and safety aspects of the mine closure process may adversely impact our business and reputation. See *Information on the Company—Regulatory matters* and *Additional Information—Legal proceedings*.

We could be adversely affected by changes in government policies or by trends such as resource nationalism, including the imposition of new taxes or royalties on mining activities.

Mining is subject to government regulation, including taxes and royalties, which can have a significant financial impact on our operations. In the countries where we are present, we are subject to potential renegotiation, nullification or forced modification of existing contracts and licenses, expropriation or nationalization of property, foreign exchange controls, capital ownership requirements, changes in local laws, regulations and policies and audits and reassessments. We are also subject to new taxes or raising of existing taxes and royalty rates, reduction of tax exemptions and benefits, renegotiation of tax stabilization agreements or changes on the basis on which taxes are calculated in a manner that is unfavorable to us. Governments that have committed to provide a stable taxation or regulatory environment may alter those commitments or shorten their duration. We also face the risk of having to submit to the jurisdiction of a foreign court or arbitration panel or having to enforce a judgment against a sovereign nation within its own territory. See *Information on the Company—Regulatory matters—Royalties and other taxes on mining activities*.

We are also required to meet domestic beneficiation requirements in certain countries, such as local processing rules, export taxes or restrictions or charges on unprocessed ores. The imposition of or increase in such requirements, taxes or charges can significantly increase the risk profile and costs of operations in those jurisdictions. We and the mining industry are subject to rising trends of resource nationalism in certain countries in which we operate that can result in constraints on our operations, increased taxation or even expropriations and nationalizations.

As a supplier of iron ore, nickel and other raw materials to the global integrated steel industry and to other metal-consuming sectors such as battery production and other specified, industrial end-uses we are subject to additional risk

from the imposition of duties, tariffs, import and export controls and other trade barriers impacting our products and the products our customers produce. Global trade is subject to a growing trend of increased trade barriers, which could exacerbate commodities' price volatility and in turn result in instability in the prices of our products.

Concessions, authorizations, licenses and permits are subject to expiration, limitation on renewal and various other risks and uncertainties.

Our operations depend on authorizations, concessions and licenses from governmental regulatory agencies and other authorities in the countries in which we operate. We are subject to laws and regulations in many jurisdictions that can change at any time, and changes in laws and regulations may require modifications to our technologies and operations and result in unanticipated capital expenditures.

Some of our mining concessions are subject to fixed expiration dates and might only be renewed a limited number of times for a limited period of time. Apart from mining concessions, we may need to obtain various authorizations, licenses and permits from governmental or other regulatory bodies in connection with the planning, maintenance, operation and closure of our mines and related logistics infrastructure, which may be subject to fixed expiration dates or periodic review or renewal. There is no assurance that renewals will be granted as and when sought, and there is no assurance that new conditions will not be imposed in connection with renewal. Fees for mining concessions might increase substantially due to the passage of time from the original issuance of each individual exploration license. If so, the costs of holding or renewing our mining concessions may render our business objectives not viable. Accordingly, we need to continually assess the mineral potential of each mining concession, particularly at the time of renewal, to determine if the costs of maintaining the concession are justified by the results of operations to date, and we might elect to let some of our concessions lapse. There can be no assurance that concessions will be obtained on terms favorable to us, or at all, for our future intended mining or exploration targets.

In a number of jurisdictions where we have exploration projects, we may be required to retrocede to the state a certain portion of the area covered by the exploration license as a condition to renewing the license or obtaining a mining concession. This requirement can lead to a substantial loss of part of the mineral deposit originally identified in our feasibility studies.

We are also subject to laws and regulations and acts by authorities, related to dams, caves, indigenous people that may limit or modify our mining plans, impact our production volumes, costs and reserves and resources. For more information on mining concessions and other similar rights, see *Information on the Company—Regulatory matters*.

Changes in Brazilian fiscal policies and tax laws could have an adverse effect on our financial condition and results and on investments in our securities.

The Brazilian government has frequently implemented and may continue to implement changes in its fiscal policies, including, but not limited to tax rates, fees, sectoral charges and occasionally the collection of temporary contributions. Changes in tax laws and in the interpretation of tax laws by Brazilian tax authorities and courts may occur and may result in tax increases and revocation of tax exemptions. Brazilian legislators are currently debating a comprehensive tax reform, which may include the elimination or unification of certain taxes, the creation of new taxes, the increase of existing taxes and contribution rates, the revocation of income tax exemptions on the distribution of profits and dividends and changes relating to interest on net equity. The approval of these legislative proposals or changes in fiscal policies, tax laws and interpretations may impact our tax obligations and may have a material adverse effect on our financial condition and results, and on investments in our securities.

OPERATIONAL RISKS

Our projects are subject to risks that may result in increased costs or delay in their implementation.

We are investing to maintain and further increase our production capacity and logistics capabilities. We regularly review the economic viability of our projects. As a result of this review, we may decide to postpone, suspend or interrupt the implementation of certain projects. Our projects are also subject to a number of risks that may adversely affect our growth prospects and profitability, including the following:

- We may not be able to obtain financing at attractive rates.
- We may encounter delays or higher than expected costs in obtaining the necessary equipment or services and in implementing new technologies to build and operate a project.
- Our efforts to develop projects on schedule may be hampered by a lack of infrastructure, including reliable telecommunications services and power supply.
- Suppliers and contractors may fail to meet their contractual obligations to us.
- We may face unexpected weather conditions or other force majeure events.
- We may fail to obtain or renew the required permits and licenses to build a project, or we may experience delays or higher than expected costs in obtaining or renewing them.
- Changes in market conditions or regulations may make a project less profitable than expected at the time we initiated work on it.
- There may be accidents or incidents during project implementation.
- We may face shortages of skilled personnel.

Operational problems could materially and adversely affect our business and financial performance.

Ineffective project management and operational breakdowns might require us to suspend or curtail operations, which could generally reduce our productivity. Operational breakdowns could entail failure of critical plant and machinery. There can be no assurance that ineffective project management or other operational problems will not occur. Any damages to our projects or delays in our operations caused by ineffective project management or operational breakdowns could materially and adversely affect our business and results of operations.

Our business is subject to a number of operational risks that may adversely affect our results of operations, such as:

- Unexpected weather conditions or other force majeure events.
- Adverse mining conditions delaying or hampering our ability to produce the expected quantity of minerals and to meet specifications required by customers, which can trigger price adjustments.
- Accidents or incidents involving our mines, industrial facilities and related infrastructure, such as dams, plants, railway and railway bridges, ports and ships.
- Delays or interruptions in the transportation of our products, including with railroads, ports and ships.
- Tropical diseases, viral outbreaks such as the coronavirus, and other contagious diseases in regions where some of our operations or projects are located, which pose health and safety risks to our employees.
- Labor disputes that may disrupt our operations from time to time.
- Changes in market conditions or regulations may affect the economic prospects of an operation and make it inconsistent with our business strategy.
- Failure to obtain the renewal of required permits and licenses, or delays or higher than expected costs in obtaining them.
- Disruptions to or unavailability of critical information technology systems or services resulting from accidents or malicious acts.
- Modern slavery, child labor, and child sexual exploitation among other human rights violations related to our activities or supply chain may also affect our business and operations.

Failures in our cybersecurity controls, information technology, operational technology and telecommunications systems may adversely affect our business and reputation.

We rely heavily on cybersecurity controls, information technology, operational technology and telecommunications systems for the operation of many of our business processes. Failures in those controls and systems, whether caused by obsolescence, technical failures, negligence, accident or cyber-attacks, may result in the disclosure or theft of

sensitive information, loss of data integrity, misappropriation of funds and disruptions to or interruption in our business operations, and impact our ability to disclose financial results. We may be the target of attempts to gain unauthorized access to information technology and operational technology systems through the internet, including sophisticated and coordinated attempts often referred to as advanced persistent threats. Disruption of critical cybersecurity controls, information technology, operational technology, or telecommunications systems, as well as data breaches, may harm our reputation and have a material adverse effect on our operational performance, earnings and financial condition.

We are subject to laws and regulations relating to data protection and data privacy, including the European Union's General Data Protection Regulation (GDPR) and Brazilian *Lei Geral de Proteção de Dados* (LGPD). Any noncompliance with those laws and regulations could result in proceedings or actions against us, the imposition of fines or penalties or damage to our reputation, which could have an adverse effect on us and our business, reputation and results of operations.

Our business could be adversely affected by the failure or unavailability of certain critical assets or infrastructure.

We rely on certain critical assets and infrastructure to produce and to transport our products to our customers. These critical assets include mines, industrial facilities, ports, railways, roads and bridges. The failure or unavailability of any critical asset, whether resulting from natural events or operational issues, could have a material adverse effect on our business.

Substantially all of our iron ore production from the Northern system is transported from Carajás, in the Brazilian state of Pará, to the port of Ponta da Madeira, in the Brazilian state of Maranhão, through the Carajás railroad (EFC). Any interruption of the Carajás railroad or of the port of Ponta da Madeira could significantly impact our ability to sell our production from the Northern system. With respect to the Carajás railroad, there is particular risk of interruption at the bridge over the Tocantins river, in which the trains run on a single line railway. In the port of Ponta da Madeira, there is particular risk of interruption at the São Marcos access channel, a deep-water channel that provides access to the port. Also, any failure or interruption of our long-distance conveyor belt (TCLD) used to transport our iron ore production from the S11D mine to the beneficiation plant, could adversely impact our operations at the S11D mine.

Our business could be adversely affected by the performance of our counterparties, contractors, joint venture partners or joint ventures we do not control.

Customers, suppliers, contractors, financial institutions, joint venture partners and other third parties may fail to perform existing contracts and obligations, which may unfavorably impact our operations and financial results. The ability of these third parties to perform their obligations may be adversely affected in times of financial stress and economic downturn.

Important parts of our iron ore, pelletizing, nickel, copper, energy and other businesses are held through joint ventures. This may reduce our degree of control, as well as our ability to identify and manage risks. Our forecasts and plans for these joint ventures and consortia assume that our partners will observe their obligations to make capital contributions, purchase products and, in some cases, provide skilled and competent managerial personnel. If any of our partners fails to observe its commitments, the affected joint venture or consortium may not be able to operate in accordance with its business plans, or we may have to increase the level of our investment to implement these plans.

Some of our investments are controlled by partners or have separate and independent management. These investments may not fully comply with our standards, controls and procedures, including our health, safety, environment and community standards. Failure by any of our contractors, partners or joint ventures to adopt adequate standards, controls and procedures could lead to higher costs, reduced production or environmental, litigation, health and safety incidents or accidents, which could adversely affect our results and reputation.

We may not have adequate insurance coverage for some business risks.

Our businesses are generally subject to a number of risks and hazards, which could have impact on people, assets and the environment. The insurance we maintain against risks that are typical in our business may not provide adequate coverage. Insurance against some risks (including liabilities for environmental damages, damages resulting from dams breaches, spills or leakage of hazardous substances and interruption of certain business activities) may not be available at a reasonable cost, or at all. Even when it is available, we may self-insure where we determine that is more cost-effective to do so. As a result, accidents or other negative developments involving our mining, production or transportation facilities may not be covered by insurance and could have a material adverse effect on our operations.

Labor disputes may disrupt our operations from time to time.

A substantial number of our employees, and some of the employees of our subcontractors, are represented by labor unions and are covered by collective bargaining or other labor agreements, which are subject to periodic negotiation. Strikes and other labor disruptions at any of our operations could adversely affect the operation of facilities and the timing of completion and cost of our capital projects. For more information about labor relations, see *Management and Employees—Employees*. Moreover, we could be adversely affected by labor disruptions involving unrelated parties suppliers that may provide us with goods or services.

Higher energy costs or energy shortages would adversely affect our business.

Costs of fuel oil, gas and electricity are a significant component of our cost of production, representing 7.6% of our total cost of goods sold in 2021. To fulfill our energy needs, we rely on the following sources: oil byproducts, which represented 37.7% of total energy needs in 2021, coal (14.8%), electricity (29.6%), natural gas (13.6%) and other energy sources (4.3%).

Electricity costs represented 2.9% of our total cost of goods sold in 2021. If we are unable to secure reliable access to electricity at acceptable prices, we may be forced to curtail production or may experience higher production costs, either of which would adversely affect our results of operations. We face the risk of energy shortages in the countries where we have operations and projects, especially Brazil, due to lack of infrastructure or weather conditions, such as floods or droughts. Future shortages, and government efforts to respond to or prevent shortages, may adversely impact the cost or supply of electricity for our operations.

Our performance and ability to achieve our ambitions and to maintain our competitive position is dependent on our culture and our capacity to attract, develop and retain skilled and experienced personnel and business partners.

Since 2019, we have been promoting a transformation of our culture, which we believe is fundamental to the implementation of our business strategy and our ambitions. See *Overview—Business overview—Responses to the rupture of the tailings dam in Brumadinho—Cultural Transformation*. Our ability to attract, develop and retain experienced and talented professionals is also dependent on this corporate culture transformation. If we fail to achieve our culture transformation goals and to attract, develop and retain talents, our reputation, performance and competitive position may be adversely impacted.

HEALTH, SAFETY, ENVIRONMENTAL AND SOCIAL RISKS

Our business is subject to environmental, health, safety and human rights incidents.

The viability of our business is intrinsically connected to the well-being of the environment, workers and communities in which we operate.

Our activity involves the use, handling, storage, discharge and disposal of hazardous substances into the environment and the use of natural resources, resulting in significant risks and potential adverse impacts on people and the environment, including fire, explosion, toxic gas leaks, spilling or seepages of polluting substances or other hazardous

materials, rockfalls, incidents involving dams, failure of other operational structures, as well as activities involving mobile equipment, vehicles or machinery and other potentially fatal incidents and accidents. Incidents may occur due to deficiencies in identifying and assessing risks or in implementing sound risk management, and once these risks materialize, they could result in significant environmental and social impacts, human rights violations, damage to or destruction of mines or production facilities, personal injury, illness and fatalities, involving employees, contractors or community members near our operations, as well as delays in production, monetary losses and possible legal liability. Additionally, our employees may be exposed to tropical and contagious diseases that may affect their health and safety. Notwithstanding our standards, policies, controls and monitoring procedures, our operations remain subject to incidents or accidents that could adversely impact our business, stakeholders, reputation or human rights.

Our business may be adversely affected by social, environmental and health and safety regulation, including regulations pertaining to climate change.

Nearly all aspects of our activities, products and services associated with capital projects and operations, including mine closure activities, around the world are subject to social, environmental and health and safety regulations, which may expose us to increased liability or increased costs. These regulations require us to have environmental licenses, permits and authorizations for our operations and projects, and to conduct environmental and social impact assessments, including a hazard identification and risk analysis, in order to get approval for our projects and permission for initiating construction and continuing operating. Significant changes to existing operations are also subject to these requirements. In connection with our authorizations, licenses and permits, we may be subject to restrictions relating to the operation and maintenance of dams, protection of indigenous people, protection of caves, fauna and flora, climate change, among others, which may require us to limit or modify our mining plans, having an impact our production volumes, costs and reserves and resources. For more information on our mining concessions and other similar rights, see *Information on the Company—Regulatory matters*. Difficulties in obtaining or renewing permits may lead to construction delays, cost increases, and may adversely impact our production volumes. Social, environmental and health and safety regulations also impose standards, procedures, monitoring and operational controls on activities relating to mineral research, mining, beneficiation, pelletizing activities, railway and marine services, ports, de-characterization, decommissioning, mine closure activities, distribution and marketing of our products. Such regulation may give rise to significant costs and liabilities. Litigation and legal and regulatory uncertainties relating to these or other related matters may adversely affect our financial condition or cause harm to our reputation. Social, environmental and health and safety regulations in many countries in which we operate have become stricter in recent years, and it is possible that more regulation or more stringent enforcement of existing regulations will adversely affect us by imposing restrictions on our activities, products, and assets, creating new requirements for the issuance or renewal of environmental licenses and labor authorizations, resulting in licensing and operation delays, raising our costs or requiring us to engage in expensive reclamation efforts. All these factors may affect our practices and result in costs or expense increase, require us to new capital expenditures, restrict or suspend operations, write down or write off assets or reserves and resources.

For a discussion of the rules relating to licensing and operations of dams following the tailings dam rupture in Brumadinho, see *Information on the Company—Regulatory matters—Brazilian regulation of mining dams*. For a discussion of the rules relating to the protection of caves in Brazil, which may require us to limit or modify our mining plans from time to time, see *Information on the Company—Regulatory matters*. For a discussion of national policies and international regulations regarding climate change, which may affect a number of our businesses in various countries, see *Information on the Company—Regulatory matters—Environmental regulations*. For a discussion of the 2020 regulatory initiatives of Standard of the International Maritime Organization (“IMO”) prohibiting high sulfur fuel oil, as well as IMO’s goals on greenhouse gas reductions in the industry, see *Information on the Company—Regulatory matters—Environmental regulations*.

Natural disasters may cause severe damage to our operations and projects in the countries where we operate and may have a negative impact on our sales to countries affected by such disasters.

Natural disasters, such as windstorms, droughts, floods, earthquakes and tsunamis may adversely affect our operations and projects in the countries where we operate and may cause a contraction in sales to countries adversely affected

due to, among other factors, power outages and the destruction of industrial facilities and infrastructure. The physical impact of climate change on our business has been assessed based on both TCFD recommendations and "Vale Climate Forecast", our methodology, but cannot be fully ascertained. We have found, so far, that we are likely to experience changes in rainfall patterns, increased temperatures, floods, droughts, water shortages, sea level rising, increased incidence and intensity of atmospheric discharges (lightning), which may adversely affect our operations. On some occasions in recent years, we have determined that force majeure events have occurred because of the effect of severe weather on our mining and logistics activities.

RISKS RELATING TO OUR MINERAL RESERVES AND MINERAL RESOURCES

Our mineral reserve estimates may materially differ from the volume of materials that we are actually able to recover; our estimates of mine life may prove inaccurate; more stringent regulations, market price fluctuations and changes in operating and capital costs may render certain mineral reserves uneconomical to mine; we may not be able to replenish our mineral reserves.

There are numerous uncertainties inherent in estimating quantities of mineral resources and mineral reserves in projecting potential future rates of mineral production, including factors beyond our control. Reduction in our mineral resources and mineral reserves may affect our future production and cash generation, impact depreciation and amortization rates, and result in asset write-downs or write-offs, which may have an adverse effect on our financial performance.

Beginning with the fiscal year ending December 31, 2021, we are required to comply with the new SEC reporting rules on mining activities, including the mineral resource reporting for the first time. Below are the key risks relating to our mineral resources and mineral reserves:

- Mineral Reserve reporting and estimates of mine life involves estimating deposits of minerals that cannot be measured in an exact manner, and the accuracy of any mineral reserve estimate is a function of the quality of available data, engineering, market prices of minerals and metals, more stringent regulations, costs estimates, investments, geotechnical analysis, geological interpretation and judgment. No assurance can be given that the indicated amount of ore will be recovered or that it will be recovered at the rates we anticipate. We review our mineral resources and reserves estimates from time to time in light of updated information and changes in regulatory framework (including conditions imposed by environmental laws and regulations), which may result in a reduction of our reported mineral resources and mineral reserves. See *Information on the Company—Reserves and resources and —Regulatory matters*.
- Difficulties or the inability to obtain licenses for new operations, supporting structures or activities (such as dams), or to renew our existing licenses, can cause a reduction of our mineral resources that could be converted into mineral reserves.
- Once mineral deposits are discovered, it can take several years from the initial phases of drilling until production is possible, during which the economic feasibility of production may change. If a project proves not to be economically feasible by the time we are able to exploit it, we may incur substantial losses and be obliged to take write-downs or at least to downgrade its mineral reserves into mineral resources categories. In addition, potential changes or complications involving metallurgical and other technological processes arising during the life of a project may result in delays and cost overruns that may render the project not economically feasible by the time of the reporting.
- We engage in mineral exploration, which is highly uncertain in nature, involves many risks and frequently is non-productive. Our exploration programs, which involve significant expenditures, may fail to result in the mineral resources definition suitable for expansion or replacement of mineral reserves depleted by current production. If we do not develop new mineral resources and reserves, we will not be able to sustain our current level of production beyond the remaining lives of our existing mines.
- Mineral reserves are gradually depleted in the ordinary course of a given open pit or underground mining operation. As mining progresses, distances to the primary crusher and to waste deposits become longer, pits become steeper, mines may move from being open pit to underground, and underground operations become deeper. In addition, for some types of deposits, mineralization grade decreases and hardness increases at

greater depths. As a result, over time, we usually experience rising unit extraction costs with respect to each mine, or we may need to make additional investments, including adaptation or construction of processing plants and expansion or construction of tailings dams. Several of our mines have been operating for long periods, and we will likely experience rising extraction costs per unit in the future at these operations in particular.

RISKS RELATING TO THE PANDEMIC OF CORONAVIRUS

Developments relating to the pandemic of the coronavirus may have a material adverse impact on our financial conditions or results of operations.

It is unclear how the COVID-19 pandemic will evolve throughout 2022 and the following years. Since March 2020, governmental authorities in various jurisdictions have imposed lockdowns or other restrictions to contain the virus, and several businesses experienced suspensions or reduced operations. We, our customers, suppliers and service providers may face restrictions imposed by regulators and authorities. These restrictions may result in difficulties related to employee absences, and consequently in insufficient personnel at some sites, disruption of our supply chain, deterioration of our customers' financial health, higher costs and expenses associated with the suspension of contractors' work on non-essential projects, operational difficulties such as the postponement of the resumption of our production capacity due to delayed inspections, assessments or authorizations, among other operational difficulties. We may need to adopt further contingency measures or eventually suspend additional operations, which may have a material adverse impact on our production and sales, result in additional costs and expenses, and eventually adversely impact our financial conditions or results of operations.

We have transitioned a significant number of our employees to a remote work regime to mitigate the spread of COVID-19, and have since adopted remote work regimes in certain areas on a permanent basis. Remote working may amplify certain risks to our businesses due to increased demand for information technology resources combined with increased risk of phishing scams and other cybersecurity attacks, increased risk of unauthorized dissemination of sensitive personal or confidential information and increased risk of business interruptions. We may also be more exposed to lawsuits from our employees alleging unpaid overtime or other labor-related claims. These risks may result in additional costs and expenses, affect our ability to operate effective internal control over financial reporting and adversely affect our reputation.

As a result of the current coronavirus pandemic outbreak, business activities worldwide, including construction and manufacturing activities that are two of the main drivers of demand for iron ore and other metals, have been significantly impacted and a general recovery of such industries may take long. If the coronavirus outbreak continues and efforts to contain the pandemic, whether governmental or otherwise, further limit business activity, or limit our ability to transport our products to customers generally for a period of time, the demand for our products could be adversely impacted. All these factors could also have a material adverse impact on our financial conditions or results of operations.

RISKS RELATING TO OUR CORPORATE STRUCTURE

The Brazilian Government has certain veto rights.

The Brazilian government owns 12 golden shares of Vale, granting it limited veto power over certain company actions, such as changes to our name, the location of our headquarters and our corporate purpose as it relates to mining activities. For a detailed description of the Brazilian government's veto powers, see *Additional information—Bylaws—Common shares and golden shares*.

We do not have a controlling shareholder or control group and we are subject to certain risks as a result.

Since 2020, we do not have a controlling shareholder or a control group that hold rights that permanently ensure it the majority of votes in the resolutions of the general shareholders' meeting and the power to elect the majority of the members of our Board of Directors. In the absence of a controlling shareholder or controlling group, the minimum quorum required by law for certain decisions at shareholders' meetings may not be reached in respect of certain matters, which could adversely affect our business. We are also exposed to shareholder activism, with shareholder groups seeking to cause us to take actions that may not be consistent with our business strategy. This may require us to incur significant expenses, and require significant time and attention from our management and Board of Directors, which could interfere with our ability to implement our business strategy and adversely affect our business and operating results.

It could be difficult for investors to enforce any judgment obtained outside Brazil against us or any of our associates.

Our investors may be located in jurisdictions outside Brazil and could seek to bring actions against us or our directors or officers in the courts of their home jurisdictions. We are a Brazilian company, and the majority of our officers and directors are residents of Brazil. The vast majority of our assets and the assets of our officers and directors are likely to be located in jurisdictions other than the home jurisdictions of our foreign investors. It might not be possible for investors outside Brazil to effect service of process within their home jurisdictions on us or on our officers or directors who reside outside their home jurisdictions. In addition, a final conclusive foreign judgment will be enforceable in the courts of Brazil without a re-examination of the merits only if previously confirmed by the Brazilian Superior Court of Justice (*Superior Tribunal de Justiça*—"STJ"), and confirmation will only be granted if the foreign judgment: (i) fulfills all formalities required for its enforceability under the laws of the country where it was issued; (ii) was issued by a competent court after due service of process on the defendant, as required under applicable law; (iii) is not subject to appeal; (iv) does not conflict with a final and unappealable decision issued by a Brazilian court; (v) was authenticated by a Brazilian consulate in the country in which it was issued or is duly apostilled in accordance with the Convention for Abolishing the Requirement of Legalization for Foreign Public Documents and is accompanied by a sworn translation into Portuguese, unless this procedure was exempted by an international treaty entered into by Brazil; (vi) it does not cover matters subject to the exclusive jurisdiction of the Brazilian courts; and (vii) is not contrary to Brazilian national sovereignty, public policy or good morals. Therefore, investors might not be able to recover against us or our directors and officers on judgments of the courts of their home jurisdictions predicated upon the laws of such jurisdictions.

RISKS RELATING TO OUR DEPOSITARY SHARES

If ADR holders exchange ADSs for the underlying shares, they risk losing the ability to remit foreign currency abroad.

The custodian for the shares underlying our ADSs maintains a registration with the Central Bank of Brazil permitting the custodian to remit U.S. dollars outside Brazil for payments of dividends and other distributions relating to the shares underlying our ADSs or upon the disposition of the underlying shares. If an ADR holder exchanges its ADSs for the underlying shares, it will be entitled to rely on the custodian's registration for only five business days from the date of exchange. Thereafter, an ADR holder may not be able to obtain and remit foreign currency abroad upon the disposition of, or distributions relating to, the underlying shares unless it obtains its own registration under applicable regulation. See *Additional Information—Exchange controls and other limitations affecting security holders*. If an ADR holder attempts to obtain its own registration, it may incur expenses or suffer delays in the application process, which could delay the receipt of dividends or other distributions relating to the underlying shares or the return of capital in a timely manner.

The custodian's registration or any registration obtained could be affected by future legislative changes, and additional restrictions applicable to ADR holders, the disposition of the underlying shares or the repatriation of the proceeds from disposition and taxation of dividends could be imposed in the future.

ADR holders may not have all the rights of our shareholders and may be unable to exercise voting rights or preemptive rights relating to the shares underlying their ADSs.

ADR holders may not have the same rights that are attributed to our shareholders by Brazilian law or our bylaws, and the rights of ADR holders may be subject to certain limitations provided in the deposit agreement or by the securities intermediaries through which ADR holders hold their securities.

ADR holders do not have the rights of shareholders. They have only the contractual rights set forth for their benefit under the deposit agreements. ADR holders are not permitted to attend shareholders' meetings, and they may only vote by providing instructions to the depository. In practice, the ability of a holder of ADRs to instruct the depository as to voting will depend on the timing and procedures for providing instructions to the depository either directly or through the holder's custodian and clearing system. With respect to ADSs for which instructions are not received, the depository may, subject to certain limitations, grant a proxy to a person designated by us.

The ability of ADR holders to exercise preemptive rights is not assured, particularly if the applicable law in the holder's jurisdiction (for example, the Securities Act in the United States) requires that either a registration statement be effective or an exemption from registration be available with respect to those rights, as is in the case in the United States. We are not obligated to extend the offer of preemptive rights to holders of ADRs, to file a registration statement in the United States, or to make any other similar filing in any other jurisdiction, relating to preemptive rights or to undertake steps that may be needed to make exemptions from registration available, and we cannot assure holders that we will file any registration statement or take such steps.

The legal protections for holders of our securities differ from one jurisdiction to another and may be inconsistent, unfamiliar or less effective than investors anticipate.

We are a global company with securities traded in several different markets and investors located in many different countries. The legal regime for the protection of investors varies around the world, sometimes in important ways, and investors in our securities should recognize that the protections and remedies available to them may be different from those to which they are accustomed in their home markets. We are subject to securities legislation in several countries, which have different rules, supervision and enforcement practices. The only corporate law applicable to our parent company is the law of Brazil, with its specific substantive rules and judicial procedures. We are subject to corporate governance rules in several jurisdictions where our securities are listed, but as a foreign private issuer, we are not required to follow many of the corporate governance rules that apply to U.S. domestic issuers with securities listed on the New York Stock Exchange, and we are not subject to the U.S. proxy rules.

II. INFORMATION ON THE COMPANY

LINES OF BUSINESS

Our principal lines of business consist of mining and related logistics. This section presents information about operations, production, sales and competition and is organized as follows

1. Ferrous minerals

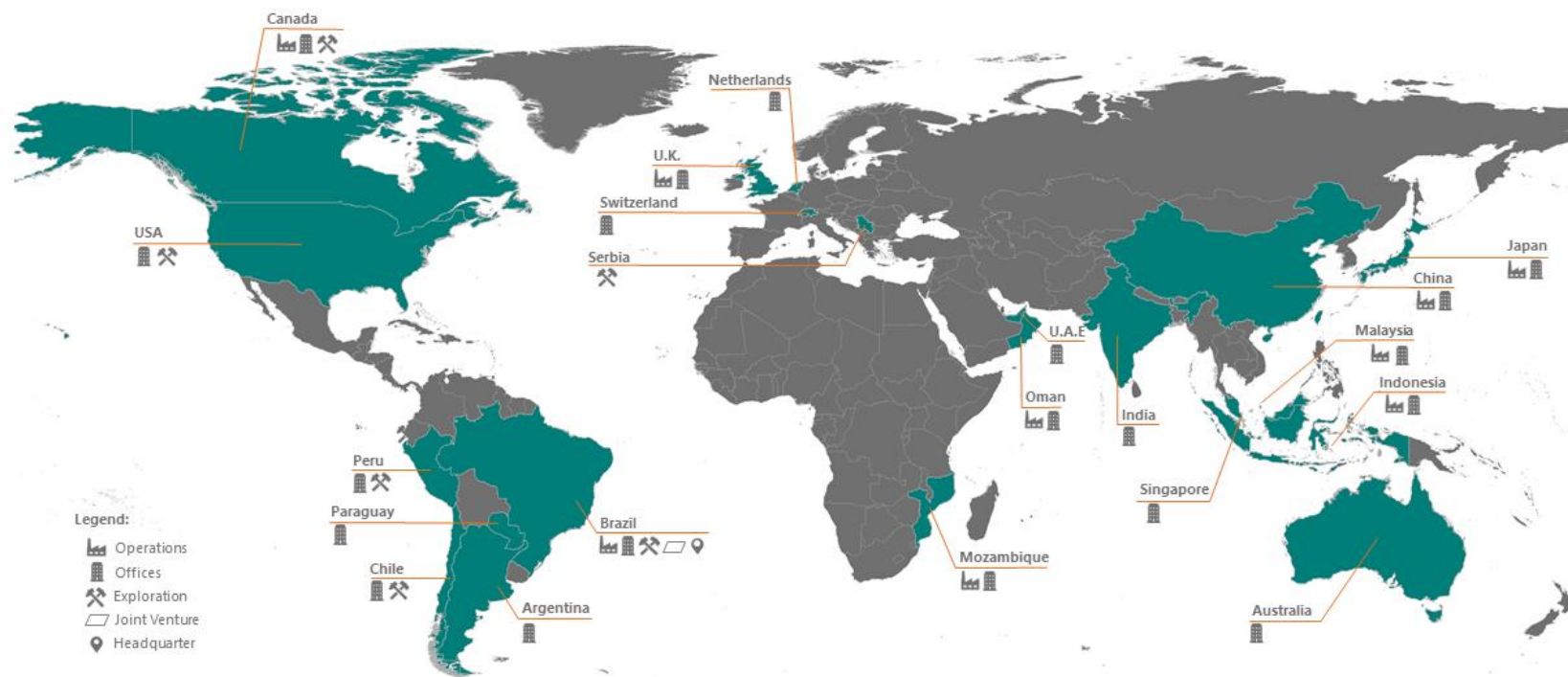
- 1.1 Iron ore and iron ore pellets
 - 1.1.1 Iron ore properties
 - 1.1.2 Iron ore production
 - 1.1.3 Individual property disclosure
 - 1.1.3.1 Serra Norte
 - 1.1.3.2 Serra Sul
 - 1.1.4 Iron ore pellets operations
 - 1.1.5 Iron ore pellets production
 - 1.1.6 Customers, sales and marketing
 - 1.1.7 Competition
- 1.2 Manganese ore
 - 1.2.1 Manganese ore properties and production
 - 1.2.2 Manganese ore: sales and competition
 - 1.2.3 Ferroalloys operations and production
- 1.3 Logistics and energy assets to support Ferrous Minerals Operations
 - 1.3.1 Railroads
 - 1.3.2 Ports and maritime terminals
 - 1.3.3 Energy

2. Base metals

- 2.1 Nickel
 - 2.1.1 Properties
 - 2.1.2 Production
 - 2.1.3 Individual property disclosure
 - 2.1.3.1 Sudbury
 - 2.1.4 Customers and sales
 - 2.1.5 Competition
- 2.2 Copper
 - 2.2.1 Properties
 - 2.2.2 Production
 - 2.2.3 Individual property disclosure
 - 2.2.3.1 Salobo
 - 2.2.4 Customers and sales
 - 2.2.5 Competition
- 2.3 PGMs and other precious metals
- 2.4 Cobalt
- 2.5 Logistics and energy assets to support Base Metals operations
 - 2.5.1 Ports
 - 2.5.2 Energy

3. Others

- 3.1 Other investments



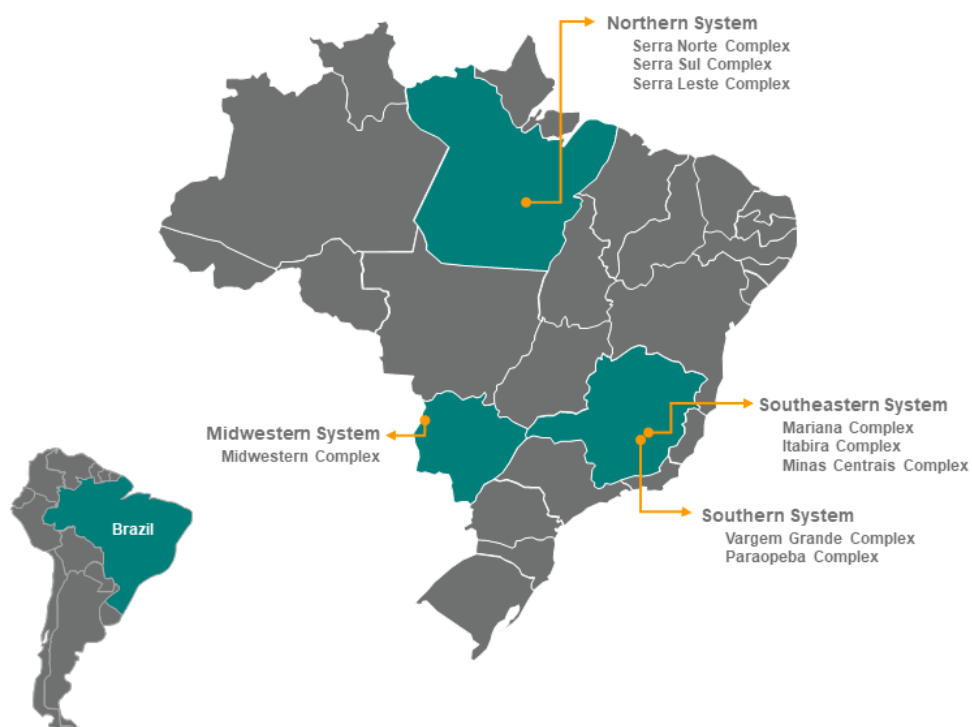
1. FERROUS MINERALS

Our ferrous minerals business includes iron ore mining, iron ore pellet production and manganese ore mining. Each of these operations is described below.

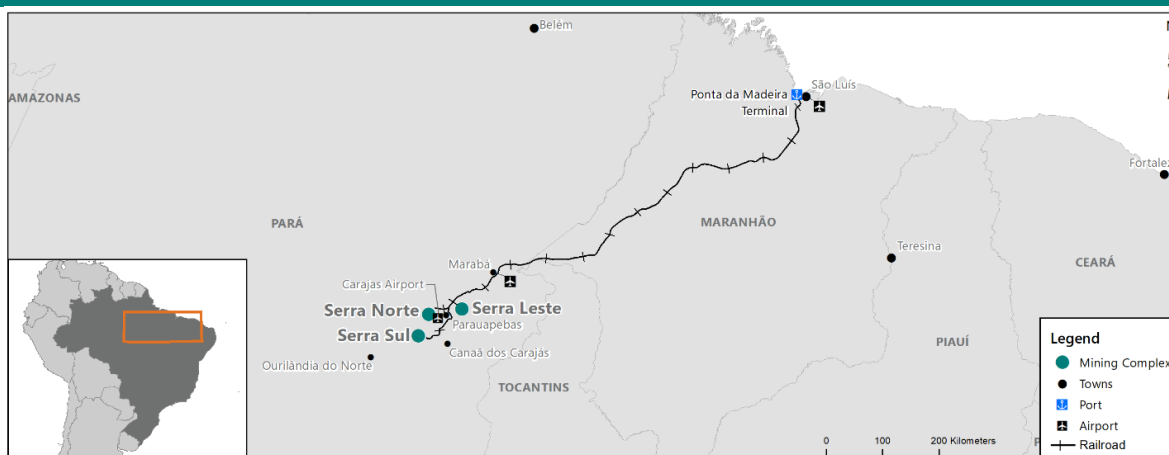
1.1 Iron ore and iron ore pellets

1.1.1 Iron ore properties

We conduct our iron ore business in Brazil primarily at the parent-company level. Our mines, all of which are open pit, and their related operations are mainly concentrated in three systems: the Southeastern, Southern and Northern Systems, each with its own transportation and shipping capabilities. We also conduct mining operations in the Midwestern System, through our subsidiary Mineração Corumbaense Reunida S.A. ("MCR"). A summary of our iron ore resources and reserves is provided under *Information on the Company—Reserves and Resources*. In addition to the properties described below, we have other non-material or non-operational properties, mostly in the surroundings of our operations described in this section.



**IRON ORE OPERATIONS
NORTHERN SYSTEM**



Ownership interest	100%
Location	Carajás, State of Pará, Brazil
Operator	Vale S.A.
Mining complexes	Three mining complexes: - Serra Norte (three main mining areas and three beneficiation plants). - Serra Sul (one main mining area and one beneficiation plant). - Serra Leste (one mining area and one beneficiation plant).
Mineral titles ⁽¹⁾	Mining concession with no expiration date. Area: Serra Norte: 30,000 ha, Serra Sul: 98,910 ha and Serra Leste: 9,915 ha.
Stage/ Operations	All the complexes are in production stage. Serra Norte has been operating since 1984, Serra Sul since 2016 and Serra Leste since 2014.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations. We are in the process of obtaining or renewing (i) certain environmental permits, including permits relating to protective buffer approvals for caves and lakes and (2) mining land zoning approval for areas with provision for environmental management plan. For information about environmental licensing, particularly with respect to caves, see <i>Information on the Company—Regulatory matters—Environmental regulations—Protection of caves</i> .
Mine types and mineralization styles	Open pit mining operations with high grade hematite ore type (iron grade around 65%) for Serra Norte, Serra Sul and Serra Leste. In Serra Leste there is also a minor amount of Itabirite material (iron grade of 35-60%).

Associated facilities and infrastructure

Processing plants: In Serra Norte, two of the beneficiation plants apply natural moisture beneficiation process, consisting of crushing and screening, and the one of the plants applies both natural moisture and wet beneficiation process in distinct lines. Wet beneficiation process consists simply of sizing operations, including screening, hydrocycloning, crushing and filtration. Output from this site consists of sinter feed, pellet feed and lump ore. Serra Leste and Serra Sul natural moisture beneficiation process consists of crushing and screening. Serra Sul and Serra Leste produce only sinter feed.

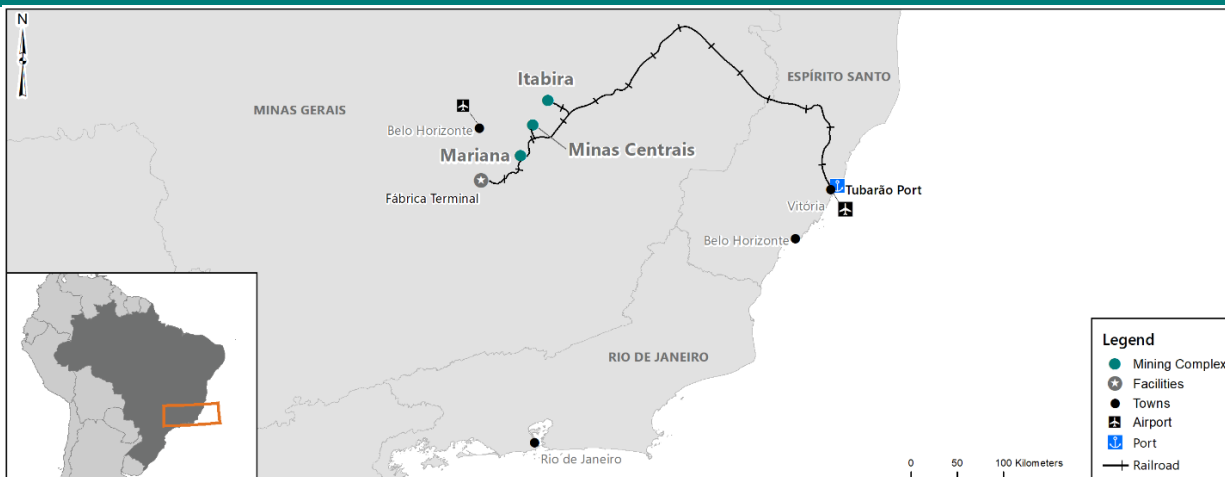
Other facilities: Waste and tailings disposal structures in Serra Norte and Serra Leste and waste disposal structures in Serra Sul.

Logistics: Carajás railroad (EFC) transports the iron ore to the Ponta da Madeira maritime terminal in the Brazilian state of Maranhão. Serra Leste iron ore is transported by trucks from the mine site to EFC railroad. The Serra Sul ore is shipped via a 101-kilometer long railroad spur to the EFC railroad.

Energy: Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements.

(1) The mining titles area illustrated are limited to those where we have reserves and resources associated.

SOUTHEASTERN SYSTEM



Ownership interest

100% of Itabira and Mariana;
98.7% of Minas Centrais (China Baowu Steel Group Corporation Limited indirectly holds 1.3% of Minas Centrais through a 50% ownership of the Morro Agudo mine).

Location

Iron Quadrangle, State of Minas Gerais, Brazil

Operator

Vale S.A.

Mining complexes

Three mining complexes:

- Itabira (two mines, with three major beneficiation plants).
- Minas Centrais (two mines, with two major beneficiation plants and one secondary plant).
- Mariana (three mines, with three major beneficiation plants).

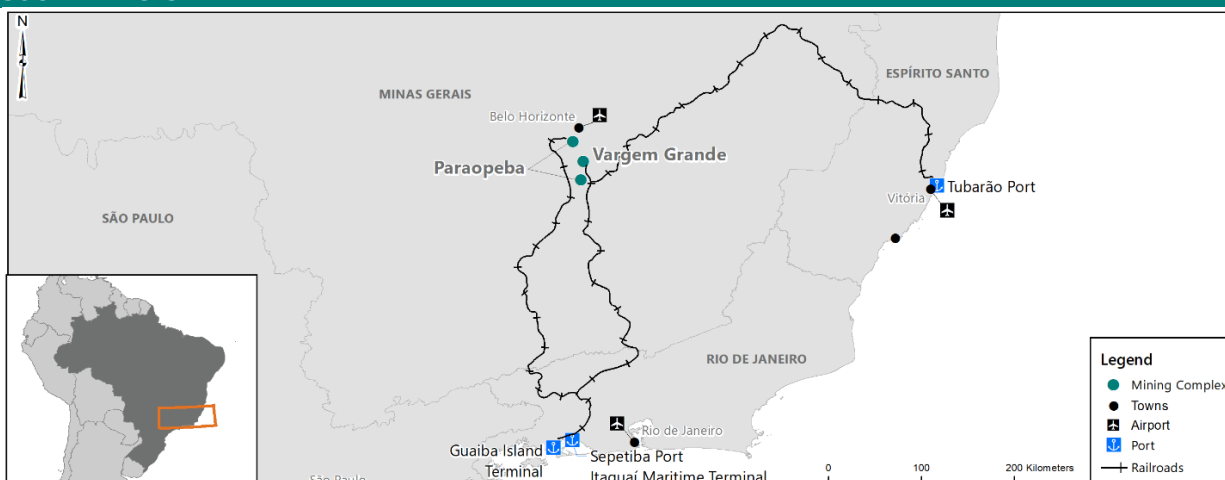
Mineral titles⁽¹⁾

Mostly mining concessions with no expiration date.
Area involved: Itabira: 9,135 ha, Minas Centrais: 4,810 ha and Mariana: 7,192 ha.

Stage/ Operations	All the complexes are in production stage. Itabira has been operating since 1957, Minas Centrais since 1994 and Mariana since 1976.
Key permit conditions	<p>We have or expect to obtain in a timely manner the necessary permits for operations.</p> <p>We are in the process of obtaining or renewing (i) certain environmental permits, including influence area study for caves and dams and (2) waste and tailings storage facilities permits. For information about environmental licensing, particularly with respect to caves, see <i>Information on the Company—Regulatory matters—Environmental regulations—Protection of caves</i> and — <i>Brazilian Regulation of Mining Dams</i>.</p>
Mine types and mineralization styles	Open pit mining operations with high ratios of itabirite ore relative to hematite ore type. Itabirite ore type has iron grade of 35-60%. Part of the ore is concentrated to achieve shipping grade and part is shipped and blended in Asia with the high-grade ore from our Northern System.
Associated facilities and infrastructure	<p><i>Processing plants:</i> We generally process the run of mine by means of standard crushing, classification and concentration steps, producing sinter feed, lump ore and pellet feed in the beneficiation plants located at the mining complexes.</p> <p><i>Other facilities:</i> Waste and tailings disposal structures in all complexes.</p> <p><i>Logistics:</i> EFVM railroad connects these mines to the Tubarão port.</p> <p><i>Energy:</i> Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements.</p>

(1) The mining titles area illustrated are limited to those where we have reserves and resources associated.

SOUTHERN SYSTEM



Ownership interest	100%
Location	Iron Quadrangle, State of Minas Gerais, Brazil
Operator	Vale S.A.
Mining complexes	Two mining complexes: - Vargem Grande (five mines and five major beneficiation plants). - Paraopeba (five mines and three major beneficiation plants).
Mineral titles ⁽¹⁾	Mostly mining concessions with no expiration date. Area involved: Vargem Grande: 5,746 ha, Paraopeba: 5,826 ha.
Stage/ Operations	All the complexes are in production stage. Vargem Grande has been operating since 1942 and Paraopeba since 2003.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations. We are in the process of obtaining or renewing (i) certain environmental permits, including influence area study for caves and dams and (2) waste and tailings storage facilities permits. For information about environmental licensing, particularly with respect to caves, see <i>Information on the Company—Regulatory matters—Environmental regulations—Protection of caves and—Brazilian Regulation of Mining Dams</i> .
Mine types and mineralization styles	Open pit mining operations with high ratios of itabirite ore relative to hematite ore type. Itabirite ore type has iron grade of 35-60%. Part of the ore is concentrated to achieve shipping grade and part is shipped and blended in Asia with the high-grade ore from our Northern System.

Associated facilities and infrastructure

Processing plants: We generally process the run of mine by means of standard crushing, classification and concentration steps, producing sinter feed, lump ore and pellet feed in the beneficiation plants located at the mining complexes.

Other facilities: Waste and tailings disposal structures in all complexes.

Logistics: MRS transports our iron ore products from the mines to our Guaíba Island and Itaguaí maritime terminals in the Brazilian state of Rio de Janeiro. EFVM railroad connects certain mines to the Tubarão port in the state of Espírito Santo.

Energy: Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements.

(1) The mining titles area illustrated are limited to those where we have reserves and resources associated.

MIDWESTERN SYSTEM



Ownership interest	100% In April 2022, we entered into a binding agreement with J&F Mineração Ltda. for the sale of all of our assets in the Midwestern System. See <i>Overview—Business overview—Significant Changes in Our Business—Divestments</i> .
Location	State of Mato Grosso do Sul, Brazil
Operator	MCR
Mining complexes	One mine and plant located in the city of Corumbá.
Mineral titles ⁽¹⁾	Mining concession with no expiration date. Area involved: 9,111 ha.
Stage/ Operations	The complex has been operating since 1978.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	Open pit mining operations with hematite ore type, which generates lump ore predominantly. Iron grade of 62% on average.
Associated facilities and infrastructure	<i>Processing plant:</i> The beneficiation process for the run of mine consists of standard crushing and classification steps, producing lump ore and sinter feed. <i>Other facilities:</i> Waste and tailings disposal structures. <i>Logistics:</i> Transported by barges traveling along the Paraguay and Paraná rivers to customers along the waterway and transhippers at the Nueva Palmira port in Uruguay or delivered to customers in Corumbá. <i>Energy:</i> Supplied through the national electricity grid. Acquired through power purchase agreements.

(1) The mining titles area illustrated are limited to those where we have reserves and resources associated.

1.1.2 Iron ore production

The following table sets forth information about our iron ore production.

Mine/Plant	Type	Production for the year ended December 31,			Process recovery 2021 ⁽²⁾ (%)
		2021 ⁽¹⁾	2020 ⁽¹⁾	2019 ⁽¹⁾	
<i>(million metric tons)</i>					
<i>Southeastern System</i>					
Itabira	Open pit	28.7	23.9	35.9	55.7
Minas Centrais ⁽³⁾	Open pit	19.3	15.7	25.9	80.4
Mariana	Open pit	21.8	17.7	11.3	83.0
Total Southeastern System		69.8	57.3	73.1	71.0
<i>Southern System</i>					
Vargem Grande	Open pit	31.3	25.1	13.1	85.6
Paraopeba	Open pit	23.0	23.3	24.7	63.4
Total Southern System		54.3	48.4	37.8	76.2
<i>Northern System</i>					
Serra Norte	Open pit	109.3	109.1	115.3	97.3
Serra Leste		5.9	0.3	0.1	99.7
Serra Sul	Open pit	73.7	82.9	73.4	100.0
Total Northern System		188.8	192.3	188.7	97.9
<i>Midwestern System⁽⁴⁾</i>					
MCR	Open pit	2.7	2.5	2.4	76.6
Total Midwestern System		2.7	2.5	2.4	76.6
Total		315.6	300.4	302.0	88.0

(1) Production figures include third-party ore purchases, run of mine and feed for pelletizing plants.

(2) Percentage of the run-of-mine recovered in the beneficiation process. Process recovery figures do not include third-party ore purchases.

(3) These figures correspond to 100% production, and are not adjusted to reflect our 50% ownership of Morro Agudo mine.

(4) In April 2022, we entered into a binding agreement with J&F Mineração Ltda. for the sale of all of our assets in the Midwestern System. See *Overview—Business overview—Significant Changes in Our Business—Divestments*.

1.1.3 Individual property disclosure

We consider Serra Norte and Serra Sul to be material properties, for purposes of Item 1300 of Regulation S-K (“S-K 1300”).

1.1.3.1 Serra Norte

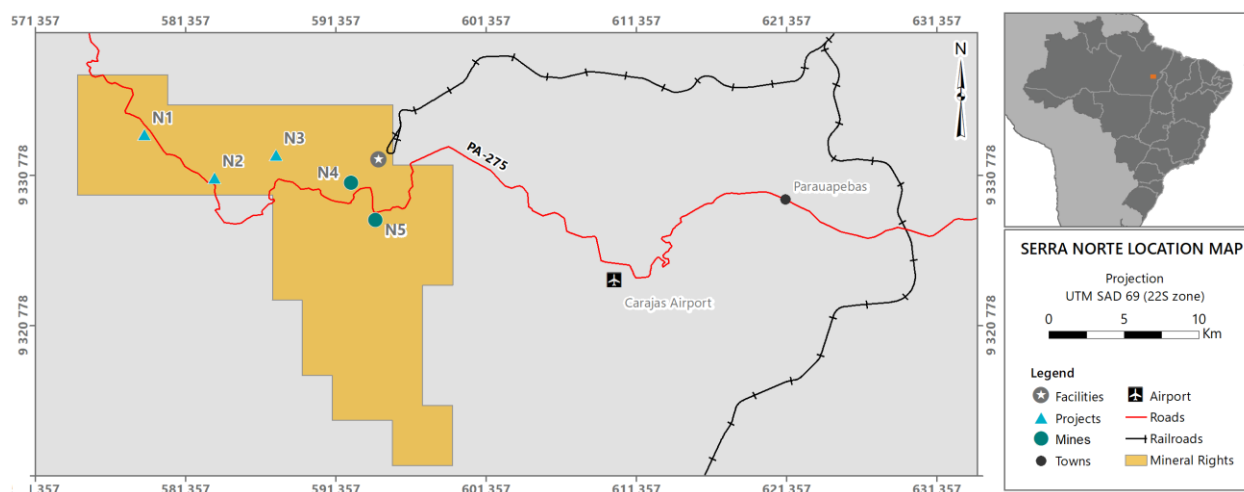
Property Description

The Serra Norte mining complex is a production stage property, part of our Northern System, located in the municipality of Parauapebas, state of Pará, in the North region of Brazil. The property consists of five orebodies (N1, N2, N3, N4, and N5) and has the approximate coordinates 587,140E, 9,331,790N using the UTM SAD 69 (Universal Transverse Mercator – South American Datum 1969) coordinate system. Central mass point coordinates of the Serra Norte mines are presented below:

Serra Norte mines central coordinates UTM South American Datum (SAD69)

Mine	Status	UTM E	UTM N
N4	Operating	590,140	9,329,567
N5	Operating	596,410	9,328,668
N1	Non-operating	579,891	9,333,075
N2	Non-operating	583,351	9,330,472
N3	Non-operating	587,140	9,331,790

The property can be accessed via regular flights between the Carajás village and the cities of Marabá, Belém, Belo Horizonte, and Brasília, as well as paved highways PA-275, PA-150, and PA-70. There is also a railroad linking Carajás with the Ponta da Madeira port, in the city of São Luis.



Infrastructure

Various services are available approximately 50 km east of the complex in Parauapebas (population 213,576, estimated 2020). A greater range of general services is available at the state capital of Belém, located approximately 770 km to the northeast. Electric power is provided through Brazil's national electricity production and transmission system. Dewatering boreholes provide a source of water that is used for dust control, washing floors and equipment. An on-site treatment plant treats borehole water for potable use. Process makeup water is sourced from the Gelado and Pera dams. Infrastructure at the complex includes a tailings storage facility, three processing plants, ore stockpiles, waste rock dumps, maintenance workshops, an assay laboratory, administration offices, and a clinic. Personnel reside mainly in the urban center of Carajás and the city of Parauapebas.

Geology and Mineralization

The main Carajás iron ore deposits are associated with flat-topped elevated plateaus, defined along two main morphological alignments corresponding to Serra Norte and Serra Sul. These alignments form the flanks of the Carajás Syncline structure. The Serra Norte complex corresponds to the inverted flank of the Carajás Syncline. Mineralization occurs mainly as a product of supergenic enrichment, developed over jaspilites (BIF – Banded Iron Formation – interlayered with basalts), generating a high-grade ore composed of friable hematite, compact hematite, and manganese hematite. The main structural controls are faults and folds that favored the BIFs thickening of the levels of jaspilite, by duplication and the efficiency of supergenic processes through the tilting and fracturing of these rocks.

Exploration

Exploration has occurred in the property since the late 1960s and includes geological mapping, drilling, ore control field sampling and geophysics. We continually invest in mineral exploration with the aim of expanding our mineral resources and mineral reserves and achieve an adequate level of confidence in the resource estimate that supports our mining plans.

Mineral rights

We have a mining concession for Serra Norte operations, under ANM Mineral Right number 813.682/1969, that covers an area of 30,000.00 ha, with no expiration date. This mining right is part of a group of permits referred to as

“Grupamento Mineiro” (number 852.145/1976), which includes mining concessions from the Carajás region, such as mining concessions of operations of Serra Sul and Serra Leste.

Surface rights

Surface rights are independent of mineral rights in Brazil. Serra Norte is located entirely within the National Forest of Carajás, which belongs to the Federal Government. We have the required licenses and authorizations from the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and the Chico Mendes Institute for Biodiversity Conservation (ICMBIO) to operate in this area. There are no associated payments related to surface rights.

Current, planned, future mining plans

Mining at Serra Norte is by traditional open pit mining methods. Ore is hauled by off-road trucks to strategically positioned primary crushing facilities, and waste is hauled to waste dumps. Plant 1 has a mixed beneficiation process, 55% wet process and 45% dry while Plants 2 and 3 have a 100% natural moisture process. The current nominal production rates are 85.0 Mty for Plant 1, 40 Mty for Plant 2, and 20 Mty for Plant 3.

The current life of mine plan runs from 2022 through 2038. The mine plan involves opening new mining areas for extraction at the N1, N2, and N3 orebodies. Additionally, Plant 1 is undergoing a conversion to a 100% natural moisture process, which is expected to be completed between 2024 and 2025.

Asset details and modernization

Serra Norte mines have been operating since 1984 and being expanded laterally and in depth, with simultaneous mining of more mineral bodies. Consequently, the average haulage distance is increasing. Crushers were implemented for the run of mine (ROM) in the pits with conveyor belts, to reduce the haulage distance. There are projects for the installation of new crushers with the same objective. In 2021, we started operating autonomous trucks. The implementation of hybrid electric powered trucks (Trolley Assist System) is expected to operate in 2023. Also, there are projects under study for the implementation of semi-mobile crushers with conveyor belts for the waste. In regions where is a needed vibration control in rock blasting, surface miners are used.

Total property book value

The book value of the Serra Norte mining complex and its associated plant and equipment was US\$2,608 million as of December 31, 2021, not including shared infrastructure assets such as ports and railways.

Operator History

The Carajás Complex has undergone exploration work since 1922. In July 1967, United States Steel began an exploration program in the region to search for manganese deposits, resulting in the first field surveys of the Serra Norte (N1, N2, N3, N4, and N5 locations) as well as the nearby Serra Sul. Exploration and evaluation activities continued, and in 1977 we acquired a shareholding in United States Steel (USS) and took over work on the project. Construction began in 1979, with operations at the N4E mine commencing in 1984. Production at the N4W mine began in 1994.

Encumbrances and permitting requirements

We hold two environmental operating licenses for the property that were valid through March 27, 2021 and are currently being renewed. According to Brazilian legislation we can continue to operate during the renewal process.

Mineral resources

The database used to estimate the grades is composed of chemical assays of Fe, SiO₂, P, Al₂O₃, Mn, LOI, TiO₂, MgO, and CaO. These elements were assayed in different size distribution fractions and later grouped into four (4) fractions, G1A (+ 19 mm), G1B (-19 + 8 mm), G2 (-8 + 0.15 mm) and G3 (-0.15 mm). The geological and block models were completed after an extensive revision of the entire database.

Five geological models (N1, N2, N3, N4 and N5) were created using explicit, implicit, or hybrid techniques (combining the two methods), differentiating the lithological domains based on the chemical, granulometric, and/or mineralogical homogeneity.

Grade interpolation uses multivariate estimation methods by Ordinary Co-Kriging based on Intrinsic Correlation Models (ICM). The estimate is attributed to the lithological domains using the hard boundary principle. That is, blocks belonging to a domain can be estimated only with samples from the same domain. Blocks estimates were validated using industry standard validation techniques.

Classification of blocks was assigned according to Risk Index methodology which combines orebody continuity and estimation error. Subsequently, this automated classification was compared with regular geometric classification method to better assess the classification.

Mineral resources were confined within an optimized conceptual pit shell. The resulting pit extents were considered for reasonableness, such as any potential impact on planned mine infrastructure (processing facilities), adequateness of the current waste projected piles capacities. Pit inter-ramp slope angles varies according to lithology and range from 22-48°.

All disclosure of mineral resources is exclusive of mineral reserves.

Serra Norte - Summary of Iron Ore Mineral Resources as of December 31, 2021 ⁽¹⁾⁽²⁾				
Category	2021 ⁽³⁾		Cut-off grade	Metallurgical recovery
	Tonnage	Grade		
Measured	592.7	66.4	N/A ⁽⁴⁾	100%
Indicated	491.5	66.1		
Measured + Indicated	1,084.2	66.3		
Inferred	293.4	66.0		

⁽¹⁾ The mineral resource prospects of economic extraction were determined based on a long-term price of US\$78/dmt for 62% iron grade.

⁽²⁾ Resources reported on an 100% basis, as operations are entirely owned by us.

⁽³⁾ Tonnage stated as metric million tons inclusive of 6.51% of moisture content and dry %Fe grade. The point of reference used is *in situ* tons.

⁽⁴⁾ The economic cut-off grade was not applied, as it is lower than the values estimated in the mineralized portion of the block model.

Mineral reserves

For a discussion of the changes from the previous fiscal year, see "Reserves and Resources."

Serra Norte – Summary of Iron Mineral Reserves as of December 31, 2021 ⁽¹⁾⁽²⁾						
Category	2021 ⁽³⁾		2020 ⁽³⁾		Cut-off grade	Metallurgical recovery
	Tonnage	Grade	Tonnage	Grade		
Proven	464.3	66.1	554.0	66.1	N/A ⁽⁴⁾	98.9%
Probable	1,125.9	65.7	1,163.2	65.6		
Total	1,590.2	65.8	1,717.2	65.8		

⁽¹⁾ The mineral reserve economic viability was determined based price curve with the long-term price being US\$70/dmt for 62% iron grade.

⁽²⁾ The reserves reported on an 100% basis, as operations are entirely owned by us.

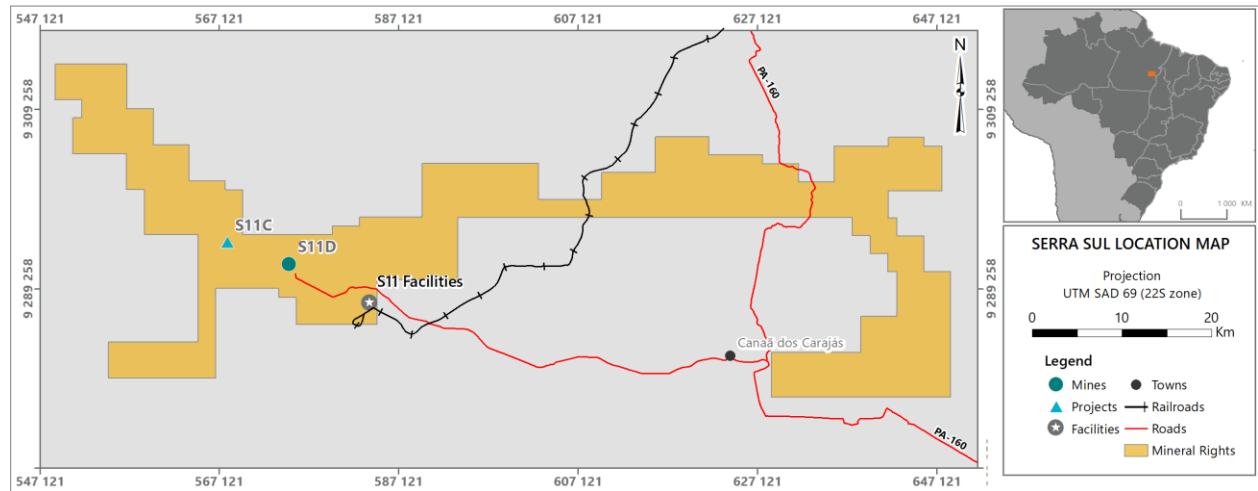
⁽³⁾ Tonnage stated as metric million tons inclusive of 6.41% of moisture content and dry %Fe grade. The point of reference used is *in situ* metric tons.

⁽⁴⁾ The economic cut-off grade was not applied, as it is lower than the values estimated in the mineralized portion of the block

1.1.3.2 Serra Sul

Property Description

Serra Sul mining complex is a production stage property, part of our Northern System, located in the municipality of Canaã dos Carajás, state of Pará, North region of Brazil at coordinates 574,671 E, 9,291,735 N using the SAD69. The property consists of orebody S11, subdivided on A, B, C, and D. Current production activities are in the S11D mine and the mineral reserves and mineral resources are defined only for the orebodies C and D. Access to the property is from Carajás airport towards Canaã dos Carajás via state roads PA-275 and PA-160, covering 83 km. Production ore is transported via railway of the southeast of Pará where it connects to the Carajás Railroad and the Ponta da Madeira port terminal in São Luís in the State of Maranhão.



Infrastructure

The nearest city to the mine complex is Canaã dos Carajás (population 38,100, estimated 2020).

Electric power is provided to the mines through Brazil's national electricity production and transmission system. Water is sourced from permitted dewatering wells and water catchments across the site and is used for industrial and domestic purposes. Infrastructure at the complex includes the open pit mine, waste dumps, processing plant, a complete maintenance workshop facility, an assay and quality control laboratory, offices, and a clinic. As the plant is a 100% natural moisture process, a tailings storage facility is not necessary for Serra Sul. Personnel reside mainly in the urban center of Canaã dos Carajás.

Geology and Mineralization

The main Carajás iron ore deposits are associated with flat-topped elevated plateaus, defined along two main morphological alignments corresponding to Serra Norte and Serra Sul. These alignments form the flanks of the Carajás Syncline structure. The Serra Sul complex corresponds to the normal flank domain of the Carajás Syncline. Mineralization at Serra Sul is mainly formed from alteration on supergenic enrichment over jaspilites (BIF – Banded Iron Formation – interlayered with basalts), generating a high-grade ore composed of friable hematite, compact hematite, and manganiferous hematite which occur in a sub-horizontal tabular layer. The main structural controls are folds and faults that are responsible for the BIF thickening of the levels of jaspilite, by duplication and the efficiency of supergenic processes through the tilting and fracturing of these rocks.

Exploration

Exploration has occurred in the property since the late 1960s and includes geological mapping, drilling, ore control field sampling and geophysics. We continually invest in mineral exploration with the aim of expanding our mineral resources and mineral reserves and achieve an adequate level of confidence in the resource estimate that supports our mining plans.

Mineral Rights

We have a mining concession for Serra Sul operations, under ANM Mineral Right number 813.684/1969, that covers an area of 98,910.42 ha. This mining right is part of a group of permits referred to as “Grupamento Mineiro” (number 852.145/1976), which includes mining concessions from the Carajás region, such as mining concessions of operations of Serra Norte and Serra Leste. In 2021, we decided to relinquish our mineral rights in indigenous lands in Brazil. For this purpose, we filed application for area reduction with respect to the mining right number 813.684/1969, reducing its area from 100,000.00 ha to 98,910.42 ha. This area reduction will become effective upon publication of ANM approval in the Official Gazette.

Surface Rights

Surface rights are independent of mineral rights in Brazil. We own the relevant properties or have easements to conduct our operations in Serra Sul.

Current, planned, future mining plans

Mining at Serra Sul is by open pit primarily using a truckless In Pit Crusher Conveyor (IPCC) mining method. There are four mobile crushing systems working in conjunction with conveyor belts that move along the benches as the mining face advances. Where IPCC is not feasible, the mine uses traditional truck-shovel methods for extraction of ore and waste. The processing plant at Serra Sul has a nominal annual capacity of 90 Mty. Additional mining areas are being assessed at Serra Sul to maintain and expand the complex’s production capacity.

Asset details and modernization

The S11 mine has been operating since 2016 and since the project was conceived there was a premise of having a minimal environmental impact on virgin forest areas. The mine operates with the truckless concept with an IPCC (In Pit Crusher Conveyor) system for waste and ore. The dump piles are also located outside the forest area and have a spreader system for waste disposal. A robust equipment and infrastructure replacement program ensures that equipment manufacturer recommendations for life of asset are followed, and key parts replaced or replaced when required. When the useful life of equipment is done, we plan and invest in upgraded equipment.

Total property book value

The book value of the Serra Sul mining complex and its associated plant and equipment was US\$3,737 million as of December 31, 2021, not including shared infrastructure assets such as ports and railways.

Operator history

The geological surveys in Serra dos Carajás, where the North System is located, began in 1922, but the first citations on the occurrence of iron formations date back to 1933. In July 1967, United States Steel began an exploration program in the region to search for manganese deposits, resulting in the first field surveys of Serra Sul as well as the nearby Serra Norte. Exploration and evaluation activities continued, and in 1977 we acquired a shareholding United States Steel and took over work on the project. In 1979, the construction of the complex, integrating the mine, railroad, and port of the Carajás Iron Project (North System) began and after 6 years, the São Luís – Carajás railroad was completed. Iron ore production began in 1984 in Serra Norte complex while Serra Sul complex started the mine operation in 2016.

Encumbrances and permitting requirements

We hold an operating license for mining, expansions, processing, and infrastructure. The operating license is valid through December 9, 2026.

Mineral resources

The database used to estimate the grades is composed of chemical assays of Fe, SiO₂, P, Al₂O₃, Mn, LOI, TiO₂, MgO, and CaO. These elements were assayed in different size distribution fractions and later grouped into 4 fractions, G1A (+ 19 mm), G1B (-19 + 8 mm), G2 (-8 + 0.15 mm) and G3 (-0.15 mm). The geological and block models were completed after an extensive revision of the entire database.

The geological model was completed entirely with implicit modeling, differentiating the lithological domains based on the chemical, granulometric, and/or mineralogical homogeneity with support of geophysical information.

The process, techniques and assumptions for grade interpolation, block classification, and the reasonable prospects for economic extraction are the same as described for Serra Norte Complex, except for the pit inter-ramp slope, which for Serra Sul Complex the angles, according to lithology, range from 19-42. All disclosure of mineral resources is exclusive of mineral reserves.

Serra Sul – Summary of Iron Ore Mineral Resources as of December 31 ⁽¹⁾⁽²⁾				
Category	2021 ⁽³⁾		Cut-off grade	Metallurgical recovery
	Tonnage	Grade		
Measured	479.9	66.0	N/A ⁽⁴⁾	100%
Indicated	388.0	64.6		
Measured + Indicated	867.8	65.4		
Inferred	123.5	64.3		

⁽¹⁾ The mineral resource prospects of economic extraction were determined based on a long-term price of US\$78/dmt for 62% iron grade.

⁽²⁾ The resources reported on an 100% basis, as operations are entirely owned by us.

⁽³⁾ Tonnage stated as metric million tons inclusive of 7.10% of moisture content and dry %Fe grade. The point of reference used is *in situ* metric tons.

⁽⁴⁾ The economic cut-off grade was not applied, as it is lower than the values estimated in the mineralized portion of the block model.

Mineral reserves

For a discussion of the changes from the previous fiscal year, see “Reserves and Resources.”

Serra Sul - Summary of Iron Ore Mineral Reserves as of December 31, 2021 ⁽¹⁾⁽²⁾						
Category	2021 ⁽³⁾		2020 ⁽³⁾		Cut-off grade	Metallurgical recovery
	Tonnage	Grade	Tonnage	Grade		
Proven	1,825.8	66.0	1,888.4	65.9	N/A ⁽⁴⁾	100%
Probable	2,447.2	65.6	2,541.8	65.6		
Total	4,273.0	65.8	4,430.1	65.7		

⁽¹⁾ The mineral reserve economic viability was determined based price curve with the long-term price being US\$70/dmt for 62% iron grade.

⁽²⁾ The reserves reported on an 100% basis, as operations are entirely owned by us.

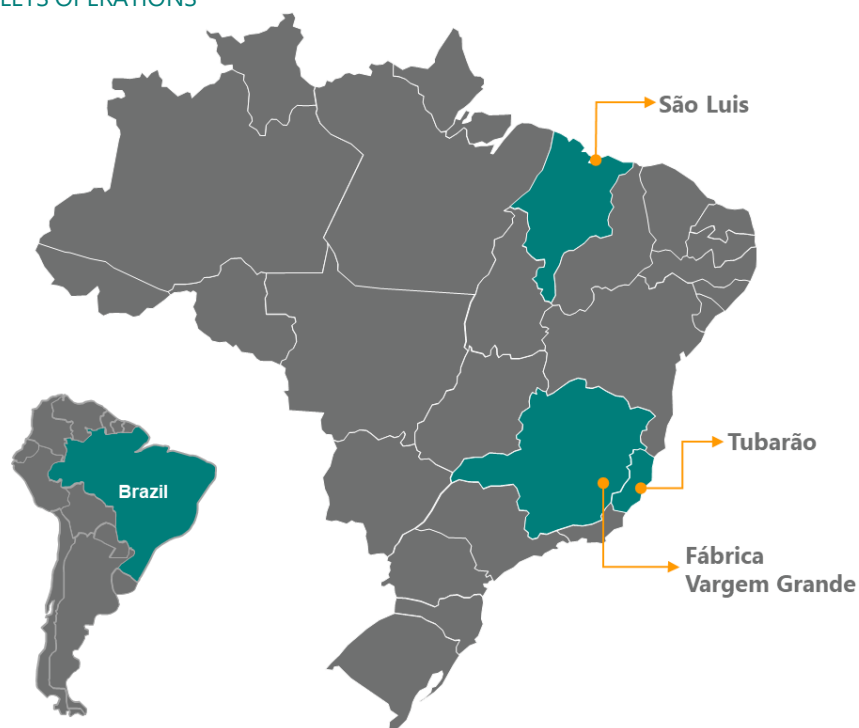
⁽³⁾ Tonnage stated as metric million tons inclusive of 7.22% of moisture content and dry %Fe grade. The point of reference used is *in situ* metric tons.

⁽⁴⁾ The economic cut-off grade was not applied, as it is lower than the values estimated in the mineralized portion of the block model.

1.1.4 Iron ore pellet operations

We produce iron ore pellets in Brazil and Oman, directly and through joint ventures, as set forth in the table below. Our total estimated nominal capacity is 59.3 Mtpy, including the full capacity of our pelletizing plants in Oman, our joint ventures and Tubarão, but not including the capacity of plants owned by our joint venture Samarco.

IRON ORE PELLETS OPERATIONS



	TUBARÃO	FÁBRICA	VARGEM GRANDE	SAO LUIS
Ownership interest(2)	- Vale Tubarão VIII (100% owned by Vale) - Itabasco (51% owned by Vale) - Hispanobras (50.89% owned by Vale) - Kobrasco (50% owned by Vale) - Two Nibrasco plants (51.11% owned by Vale)	100% owned by Vale	100% owned by Vale	100% owned by Vale
Location	State of Espírito Santo, Brazil	State of Minas Gerais, Brazil	State of Minas Gerais, Brazil	State of Maranhão, Brazil
Operator	Vale S.A.	Vale S.A.	Vale S.A.	Vale S.A.
Capacity (Mtpy)	31.3(1)	4.5	7.0	7.5

	TUBARÃO	FÁBRICA	VARGEM GRANDE	SAO LUIS
Operations	One wholly owned pellet plant (Tubarão VIII) and five leased plants (Itabasco, Hispanobras, Kobrasco and two Nibrasco plants). These plants receive iron ore primarily from our Southeastern System mines	Part of the Southern System. Receives iron ore from the Paraopeba complex and purchases from third parties. Since February 2019, Fabrica operations are suspended.	Part of the Southern System. Receives iron ore from the Vargem Grande complex.	Part of the Northern System. Receives iron ore from the Carajás mines.
Energy	Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements	Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements.	Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements.	Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements.
Logistics	Production is shipped to customers through our Tubarão maritime terminal.	Production is mostly transported by MRS and EFVM.	Production is mostly transported by MRS.	Production is shipped to customers through our Ponta da Madeira maritime terminal.

(1) Our environmental operating licenses for the Tubarão pellet plants provide for a capacity of 36.2 Mtpy.

(2) The operating lease for the Hispanobras pellet plant expires in July 2022, for the Itabasco pellet plant in June 2023, for the Nibrasco pellet plant in December 2025, and for the Kobrasco pellet plants in 2033

OMAN



VALE OMAN PELLETIZING COMPANY LLC

Ownership interest	70% stake <i>Partner:</i> OQ S.A.O.C.
Location	Sohar, Oman
Operator	Vale S.A.
Capacity	9.0
Operations	Vale's industrial complex. Two pellet plants with total nominal capacity of 9.0 Mtpy. The pelletizing plant is integrated with our distribution center that has a nominal capacity of 40.0 Mtpy. The Oman plant is supplied by iron ore from the Iron Quadrangle state of Minas Gerais through the Tubarão port and by iron ore from Carajás through the Ponta da Madeira maritime terminal.
Energy	Supplied through the national electricity grid.

1.1.5 Iron ore pellets production

The following table sets forth information about our main iron ore pellet production.

Operator	Production for the year ended December 31,		
	2021	2020	2019
	<i>(million metric tons)</i>		
Vale ⁽¹⁾	31.7	29.7	41.8

(1) These figures correspond to 100% production from our pellet plants in Oman and in Tubarão and the four pellet plants we lease in Brazil, and are not adjusted to reflect our ownership.

1.1.6 Customers, sales and marketing

We supply all of our iron ore and iron ore pellets to the steel industry. Prevailing and expected levels of demand for steel products affect demand for our iron ore and iron ore pellets. Demand for steel products is influenced by many factors, such as global manufacturing production, civil construction and infrastructure spending. For further information about demand and prices, see *Operating and Financial Review and Prospects—Overview—Major factors affecting prices*.

In 2021, China accounted for 64% of our iron ore and iron ore pellet shipments, and Asia as a whole accounted for 79%, Brazil accounted for 10%, Europe accounted for 7% followed by the Middle East with 3% and others with 1%. Our ten largest customers collectively purchased 127 million metric tons of iron ore and iron ore pellets from us, representing 41% of our 2021 iron ore and iron ore pellet sales volumes and 40% of our total iron ore and iron ore pellet revenues.

In 2021, no individual customer accounted for more than 10% of our iron ore and iron ore pellet shipments.

Of our 2021 pellet production, 59% was blast furnace pellets and 41% was direct reduction pellets. Blast furnace and direct reduction are different technologies employed by steel mills to produce steel, each using different types of pellets. In 2021, the Brazilian markets and the Asian market (mainly China and Japan) were the primary markets for our blast furnace pellets, while the Middle East and North America were the primary markets for our direct reduction pellets.

We invest in customer service in order to improve our competitiveness. We work with our customers to understand their objectives and to provide them with iron ore solutions to meet specific customer needs. Using our expertise in mining, agglomeration and iron-making processes, we search for technical solutions that will balance the best use of our world-class mining assets and the satisfaction of our customers. We believe that our ability to provide customers with a total iron ore solution and the quality of our products are both very important advantages helping us improve our competitiveness in relation to competitors that may be more conveniently located geographically. In addition to offering technical assistance to our customers, we have offices in St. Prex (Switzerland), Tokyo (Japan), Singapore, Dubai (UAE), Shanghai, Beijing and Qingdao (China), which support global sales by Vale International. These offices also allow us to stay in close contact with our customers, monitor their requirements and our contract performance, and ensure that our customers receive timely deliveries.

We sell iron ore and iron ore pellets under different arrangements, including long-term contracts with customers and on a spot basis through tenders and trading platforms. Our pricing is generally linked to market price indexes and uses a variety of mechanisms, including current spot prices and average prices over specified periods. In cases where the products are priced before the final price is determinable at delivery, we recognize the sale based on a provisional price with a subsequent adjustment reflecting the final price.

In 2021, we hedged part of our total exposure to bunker oil prices relating to long-term contracts of affreightment connected to our FOB and CFR international and domestic sales.

1.1.7 *Competition*

The global iron ore and iron ore pellet markets are highly competitive. The main factors affecting competition are price, quality and range of products offered, reliability, operating costs and shipping costs.

Asia - Our main competitors in the Asian market are located in Australia and include subsidiaries and affiliates of BHP Billiton, Rio Tinto Ltd ("Rio Tinto") and Fortescue Metals Group Ltd.

- We are competitive in the Asian market for two main reasons. (1) First, steel companies generally seek to obtain the types (or blends) of iron ore and iron ore pellets that can produce the intended final product in the most economic and efficient manner. Our iron ore has low impurity levels and other properties that generally lead to lower processing costs. For example, in addition to its high-grade, the alumina content of our iron ore is very low compared to Australian ores, reducing consumption of coke and increasing productivity in blast furnaces, which is particularly important during periods of high demand and environmental restrictions. When market demand is strong, our quality differential generally becomes more valuable to customers. (2) Second, steel companies often develop sales relationships based on a reliable supply of a specific mix of iron ore and iron ore pellets. Our ownership and operation of logistics facilities in the Northern and Southeastern Systems help us ensure that our products are delivered on time and at a relatively low cost.
- We rely on long-term contracts of affreightment to secure transport capacity and enhance our ability to offer our products in the Asian market at competitive prices on a CFR basis, despite higher freight costs compared to Australian producers.
- To support our commercial strategy for our iron ore business, we operate two distribution centers, one in Malaysia and one in Oman and we have long-term agreements with nineteen ports in China, which also serve as distribution centers.
- In 2015, we launched the Brazilian blend fines (BRBF), a product resulting from blending fines from Carajás, which contain a higher concentration of iron and a lower concentration of silica in the ore, with fines from the

Southern and Southeastern Systems, which contain a lower concentration of iron in the ore. In August 2018, Metal Bulletin launched a new index, the 62% Fe low-alumina index, which is based on our BRBF. During 2020, the 62% Fe low-alumina index traded with a premium of US\$1.2 per dmt over the 62% Fe index. The resulting blend offers strong performance in any kind of sintering operation. It is produced in our Teluk Rubiah Maritime Terminal in Malaysia and in the seventeen distribution centers in China, which reduces the time to reach Asian markets and increases our distribution capillarity by using smaller vessels.

- In 2019, launched the GF88, a new product to supply the growing market of pellet production in China, which consists of Carajás fines (IOCJ) obtained through a grinding process, opening a new market for our high-quality portfolio.

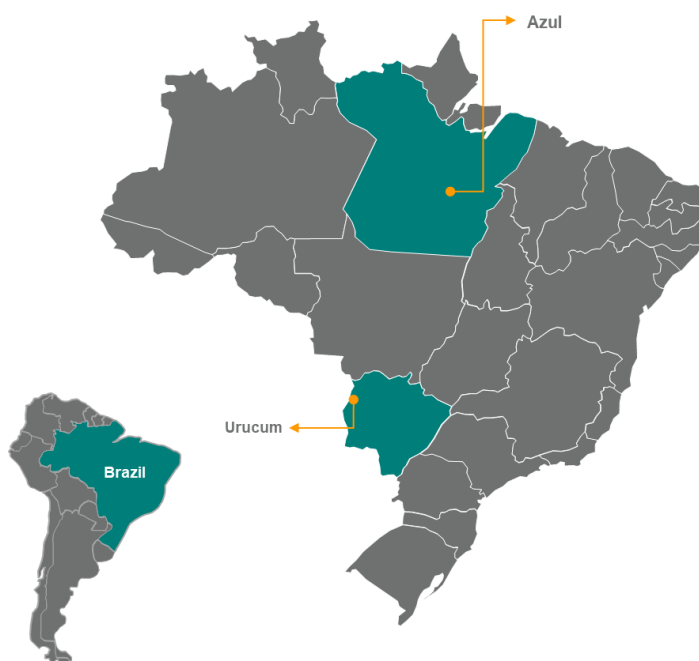
Europe - Our main competitors in the European market are Luossavaara Kiirunavaara AB (LKAB), ArcelorMittal Mines Canada Inc., Iron Ore Company of Canada, a subsidiary of Rio Tinto., Kumba Iron Ore Limited and Société Nationale Industrielle et Minière. We are competitive in the European market for the same reasons as in Asia, and due to the proximity of our port facilities to European customers.

Brazil - The Brazilian iron ore market is also competitive and includes several small iron ore producers. Some steel companies, including Gerdau S.A., Companhia Siderúrgica Nacional (CSN), Vallourec Tubos do Brasil S.A., Usiminas and Arcelor-Mittal, also have iron ore mining operations. Although pricing is relevant, quality and reliability are important competitive factors as well. We believe that our integrated transportation systems, high-quality ore and technical services make us a strong competitor in the Brazilian market. With respect to pellets, our major competitors are LKAB, Iron Ore Company of Canada, Ferrexpo Plc, Arcelor-Mittal Mines Canada, Samarco and Bahrain Steel.

1.2 Manganese ore

1.2.1 Manganese ore properties and production

We conduct our manganese mining operations in Brazil through our parent company Vale S.A. and our wholly owned subsidiary MCR. Our mining operations are carried out under concessions from the federal government granted for an indefinite period, subject to the life of mines. Our mines produce metallurgical ore, used primarily to produce manganese ferroalloys, a raw material used to produce carbon and stainless steel.



MANGANESE ORE OPERATIONS

AZUL

Ownership interest	100%
Location	Carajás, State of Pará, Brazil.
Operator	Vale S.A.
Mining title	Mining concession for indefinite period. Acreage: 4.650 ha
Stage/ Operations	Open pit mining operations and on-site beneficiation plant. Crushing, scrubbing and classification steps, producing lumps and fines. Azul mine operations have been suspended since March 2020 due to strategic review.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	High and medium grade oxide ores (24 and 46% manganese grade).
Associated facilities and infrastructure	<i>Processing Plant:</i> Crushing, scrubbing and classification steps, producing lumps and fines. <i>Other facilities:</i> Waste and tailings disposal structures. <i>Logistics:</i> Manganese ore is transported by truck and EFC railroad to the Ponta da Madeira maritime terminal. <i>Energy:</i> Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements.

URUCUM	
Ownership interest	100%
Location	State of Mato Grosso do Sul, Brazil.
Operator	MCR
Mining title	Mining concession for indefinite period. Acreage: 2.885 ha
Stage/ Operations	Underground mining operations and on-site beneficiation plant. Crushing, screening and dense heavy medium separation DMS / HMS process producing lumps to the Barbacena and Ouro Preto ferroalloy plants. Urucum mine operations have been suspended since October 2021 due to strategic review.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	High and medium grade oxide ores (an average content of 46% manganese grade).
Associated facilities and infrastructure	<i>Processing Plant:</i> Crushing, screening and dense heavy medium separation DMS / HMS process producing lumps to the Barbacena and Ouro Preto ferroalloy plants. <i>Other facilities:</i> Tailings disposal structures. <i>Logistics:</i> Manganese ore is transported by barge traveling along the Paraguay and Paraná rivers to transhippers at the Nueva Palmira port in Uruguay or delivered to customers in Corumbá. <i>Energy:</i> Supplied through the national electricity grid. Acquired through power purchase agreements.

The following table sets forth information about our manganese ore production, obtained after beneficiation process, and mass recovery.

Mine	Type	Production for the year ended			2021 process recovery(1)
		2021	December 31, 2020	2019	
		(million metric tons)			(%)
Azul	Open pit	0	0.2	1.0	-
Urucum	Underground	0.2	0.4	0.4	85.5
Total		0.2	0.7	1.6	

(1) Percentage of the run-of-mine recovered in the beneficiation process.

1.2.2 Manganese ore: sales and competition

The markets for manganese ore are highly competitive. Competition in the manganese ore market takes place in two segments. High- and medium-grade manganese ore competes on a global seaborne basis, while low-grade ore competes on a regional basis. For some manganese ferroalloys, especially ferromanganese, higher-grade manganese ores are required to achieve competitive quality and cost, while medium- to lower-grade ores may be used in silicomanganese production.

In recent years, production on a contained metal basis has grown more strongly than gross weight output. This is due to the fact that the average manganese content of global ore production has increased, mainly as a result of a decline in the output of very low-grade ores in China.

On a contained manganese basis, the top-five producing countries are South Africa, Australia, Gabon, Ghana, Brazil and China, which combined accounted for 84% of output in 2020. The geographical distribution of manganese ore output is quite similar to that of global reserves. The most significant trend in manganese ore production over the past two decades has been a huge increase in output in South Africa, and a corresponding decline in Chinese production. In the past two years there has also been a significant increase in output outside of South Africa, much of it in four other

African countries (Ghana, Gabon, Cote d'Ivoire and Zambia). Brazil is the fifth-largest producing country; with fairly stable output over most of the past decade, before a substantial increase in 2019.

We compete in the seaborne market with both high- and medium-grade ores from the Azul and Urucum mines, where we benefit from extensive synergies with our iron ore operations, from mine to rail to port to vessel operations. Our main competitors in this segment are South32 (Australia and South Africa) and Eramet (Gabon).

1.2.3 Manganese ferroalloys operations and production

We no longer produce manganese ferroalloys. In January 2022, we sold our ferroalloys operations in Barbacena and Ouro Preto, in the state of Minas Gerais, to VDL. In 2020, we shut down our operations in Simões Filho, state of Bahia.

The following table sets forth information about our manganese ferroalloys production.

Plant	Production for the year ended December 31(1),		
	2021	2020	2019
	<i>(thousand metric tons)</i>		
Barbacena	54	51	54
Ouro Preto	17	11	11
Simões Filho	-	11	86
Total	71	73	151

(1) Production figures reflect hot metal, which is further processed by a crushing and screening facility. Average mass recovery in this process is 85%.

1.3 Logistics and energy assets to support Ferrous minerals operations

1.3.1 Railroads

Vitória a Minas railroad ("EFVM"). The EFVM railroad links our Southeastern System mines in the Iron Quadrangle region in the Brazilian state of Minas Gerais to the Tubarão port, in Vitória, in the Brazilian state of Espírito Santo.

- We operate this 888-kilometer railroad under a concession agreement, which was recently renewed and will expire in 2057.
- The EFVM railroad consists of two lines of track extending for a distance of 584 kilometers to permit continuous railroad travel in opposite directions, and single-track branches of 304 kilometers. Industrial manufacturers are located in this area and major agricultural regions are also accessible to it.
- VLI S.A. ("VLI") has rights to purchase railroad transportation capacity on our EFVM railroad.
- In 2021, the EFVM railroad transported 74,685 thousand metric tons of iron ore and 20,943 thousand metric tons of other cargo. The EFVM railroad also carried 0.4 million passengers in 2021. In 2021, we had a fleet of 321 locomotives and 12,298 wagons at EFVM, which were operated by us and third parties.

Carajás railroad ("EFC"). The EFC railroad links our Northern System mines in the Carajás region in the Brazilian state of Pará to the Ponta da Madeira maritime terminal, in São Luis, in the Brazilian state of Maranhão.

- We operate the EFC railroad under a concession agreement, which was recently renewed and will expire in 2057. EFC extends for 997 kilometers from our Carajás mines to our Ponta da Madeira maritime terminal complex facilities. Its main cargo is iron ore, principally carried for us.
- VLI has rights to purchase railroad transportation capacity on our EFC railroad.
- In 2021, the EFC railroad transported 188,335 thousand metric tons of iron ore and 14,020 thousand metric tons of other cargo. EFC also carried 187 thousand passengers in 2021. EFC supports the largest train, in terms of capacity, in Latin America, which measures approximately 3.4 kilometers, weighs approximately 41.5 thousand gross metric tons when loaded and has 333 cars. In 2021, EFC had a fleet of 298 locomotives and 25,175 wagons, which were operated by Vale and third parties.

The principal items of cargo of the EFVM and EFC railroads are:

- iron ore and iron ore pellets and manganese ore, carried for us and customers;
- steel, coal, pig iron, limestone and other raw materials carried for customers with steel mills located along the railroad;
- agricultural products, such as soybeans, soybean meal and fertilizers; and
- other general cargo, such as pulp, fuel and chemical products.

We charge market prices for customer freight, including iron ore pellets originating from joint ventures and other enterprises in which we do not have a 100% equity interest. Market prices vary based on the distance traveled, the type of product transported and other criteria, subject to price caps set forth in the relevant concession agreements, and are regulated by the Brazilian transportation regulatory agency, ANTT (*Agência Nacional de Transportes Terrestres*).

1.3.2 Ports and maritime terminals

Brazil

We operate ports and maritime terminals principally as a means to complete the delivery of our iron ore and iron ore pellets to bulk carrier vessels serving the seaborne market. See —*Ferrous minerals—Iron ore and iron ore pellets—Iron ore operations*. We also use our ports and terminals to handle customers' cargo.

Tubarão and Praia Mole Ports. The Tubarão port, which covers an area of 18 square kilometers, is located in the Brazilian state of Espírito Santo and contains the iron ore maritime terminal and the general cargo terminals (*Terminal de Granéis Líquidos* and the *Terminal de Produtos Diversos*).

- The iron ore maritime terminal has two piers. From this terminal in the Tubarão port, we export mostly iron ore produced from our Southeastern system. The iron ore maritime terminal has a storage yard with a capacity of 2.9 million metric tons. In 2021, 57.6 million metric tons of iron ore and iron ore pellets were shipped through the terminal for us.
- Pier I can accommodate two vessels at a time, one of up to 170,000 DWT on the southern side and one of up to 210,000 DWT on the northern side. In Pier I there are two ship loaders, which can load up to 13,500 metric tons per hour each.
- Pier II can accommodate one vessel of up to 405,000 DWT at a time, limited at 23 meters draft. In Pier II there are two ship loaders that work alternately and can each load up to 16,000 metric tons per hour continuously.
- The Terminal de Produtos Diversos handled 5.95 million metric tons of grains and fertilizers in 2021. VLI has the right to purchase capacity of the Terminal de Produtos Diversos, upon agreement with us on volume.
- The Terminal de Granéis Líquidos handled 0.6 million metric tons of fuel in 2021. VLI has the right to purchase capacity of the Terminal de Granéis Líquidos, upon agreement with us on volume.

The Praia Mole port is also located in the Brazilian state of Espírito Santo. The Praia Mole terminal is principally a coal terminal and handled 12.05 million metric tons of coal and other related cargo in 2021. VLI has the right to purchase capacity of the Praia Mole terminal, upon agreement with us on volume.

Ponta da Madeira maritime terminal. Our Ponta da Madeira maritime terminal is located in the Brazilian state of Maranhão.

- Pier I can accommodate vessels of up to 420,000 DWT and has a maximum loading rate of 16,000 metric tons per hour. Pier III, which has two berths and three shiploaders, can accommodate vessels of up to 210,000 DWT at the south berth and 180,000 DWT at the north berth (or two vessels of 180,000 DWT simultaneously), subject to tide conditions, and has a maximum loading rate of 8,000 metric tons per hour in each shiploader.
- Pier IV (south berth) is able to accommodate vessels of up to 420,000 DWT and have two ship loaders that work alternately with a maximum loading rate of 16,000 metric tons per hour.
- In 2018, Vale received from the Brazilian tax authorities, the customs authorization for the operations of Pier IV (north berth). Cargo shipped through our Ponta da Madeira maritime terminal consists of the Northern

system production of iron ore, pellets and manganese. Pier IV (north berth) is able to accommodate vessels of up to 420,000 DWT and have two ship loaders that work alternately with a maximum loading rate of 16,000 metric tons per hour.

- In 2021, 182.9 million metric tons of iron ore, pellets and manganese were shipped through the terminal. The Ponta da Madeira maritime terminal has a storage yard with a static capacity of 7.2 million metric tons.

Itaguaí maritime terminal—Cia. Portuária Baía de Sepetiba (“CPBS”). From this terminal we mostly export iron ore from our Southern system. CPBS is a wholly owned subsidiary that operates the Itaguaí terminal, at the Itaguaí Port, in Sepetiba in the Brazilian state of Rio de Janeiro, which is leased from Companhia Docas do Rio de Janeiro (CDRJ) until 2026, with a proposal for an extension for more 25 years, currently under analysis by the Ministry of Infrastructure, federal regulatory agency and Port Authority. The Itaguaí port terminal has a pier with one berth that allows the loading of ships up to 17.8 meters of draft and approximately 200,000 DWT of capacity. In 2021, the terminal loaded 16.3 million metric tons of iron ore.

Guaíba Island maritime terminal. From this terminal we export mostly iron ore from our Southern system. We operate a maritime terminal on Guaíba Island in the Sepetiba Bay, in the Brazilian state of Rio de Janeiro. The iron ore terminal has a pier with two berths that allows the loading of ships of up to 350,000 DWT. In 2021, the terminal loaded 26.5 million metric tons of iron ore.

Gregório Curvo river terminal (“PGC”). This terminal is responsible for loading barges with iron ore from our Midwestern System, destined to the Argentine market and to Corporación Navios port (Uruguay) for transshipment to ocean going vessels. Is located on the left margin of Paraguay River in the city of Corumbá, state of Mato Grosso do Sul. In 2021, the terminal loaded 1.9 million metric tons of iron ore.

Uruguay

Since October 2017, our subsidiary Vale Logística Uruguay S.A. (“VLU”) contracts third-party services to operate the Corporación Navios port terminal in the Nueva Palmira Free Zone in Uruguay. The port terminal provides facilities for the unloading, storing, weighing and loading of bulk materials from Corumbá, Brazil, by river barge for transshipment to ocean-going vessels destined for Brazilian, Asian and European markets. In 2021, we handled 0.2 million metric tons of iron and manganese ore through the Corporación Navios port.

Oman

Vale Oman Distribution Center LLC is part of the Oman Industrial Complex and operates a blending and distribution center in Liwa, Sultanate of Oman. The maritime terminal has a large deep-water jetty, a 600-meter long platform connected to the shore by means of a 700-meter long trestle, and is integrated with a storage yard that has throughput capacity to handle 40 Mtpy of iron ore and iron ore pellets per year. The loading nominal capacity is 10,000 metric tons per hour and the nominal unloading capacity is 9,000 metric tons per hour.

Malaysia

Teluk Rubiah Maritime Terminal (“TRMT”). TRMT is located in the Malaysian state of Perak and has a pier with two berths that allows the unloading of vessels of approximately 400,000 DWT of capacity and the loading of vessels up to 220,000 DWT of capacity. In 2021, the terminal unloaded 20.4 million metric tons of iron ore and loaded 20.1 million metric tons of iron ore.

Shipping – Maritime shipping of iron ore and pellets

In 2021, we shipped approximately 261 million metric tons of iron ore and pellets in transactions in which we were responsible for transportation. We ship a large amount of our iron ore products from Brazil to Asia through long-term contracts of affreightment with owners of very large ore carriers (VLOCs). These vessels reduce energy consumption and greenhouse emissions by carrying an increased amount of cargo in a single trip, offering lower shipping costs. Also, this dedicated fleet protects us from most of the volatility and strength of the capesize spot market. In 2021, approximately 127 million metric tons of iron ore products were transported under long term contracts of affreightment

on VLOCs of 400,000 DWT and 325,000 DWT.

In light of the IMO regulation that limits global Sulphur emissions to 0.5%, which became effective on January 2020, we negotiated the fitting of scrubbers on the majority of the vessels employed under long term contracts of affreightment. These scrubbers will allow us to continue bunkering high-sulphur fuel oil, while complying with the new regulation. We expect 97% of the vessels employed under our long term contracts of affreightment to be scrubber-fitted by the end of 2022.

In January 2021, following our new risk management approach, we have decided to phase out or have all converted vessels engaged in our cargo transportation replaced, either through the early termination or the amendment of contracts. Our freight competitiveness is preserved through long-term contracts with shipowners for the use of more efficient and modern vessels as Valemax and Guaibamax.

Paraná—Paraguay waterway system

Through our subsidiary, Transbarge Navegación, and other chartered convoys, we transport iron ore and manganese ores through the Paraná and Paraguay waterway system. The barges are unloaded in our local customers' terminals in Argentina or in a contracted terminal in the Nueva Palmira Free Zone in Uruguay, where we load the ore into ocean vessels. We transported 1.52 million metric tons through the waterway system in 2021, including 1.29 million metric tons of ore to our local customers' terminals and 0.23 million metric tons of ore through the contracted port terminal in Uruguay.

1.3.3 Energy

We have developed our energy assets based on the current and projected energy needs of our operations, with the goal of reducing our energy costs, minimizing the risk of energy shortages and meeting our consumption needs through renewable sources.

Energy management and efficient supply in Brazil are priorities for us, given the uncertainties associated with changes in the regulatory environment and the risk of rising electricity prices. In 2021, our installed capacity in Brazil was 1.8 GW, sourced from both directly and indirectly owned power plants. We use the electricity produced by these plants for our internal consumption needs. We currently have direct stakes in three hydroelectric power plants and own two small hydroelectric power plants:

- The hydroelectric power plant of Candonga, located in the Southeastern region, the operations of which remain suspended since November 2015 as a result of the rupture of Samarco's tailings dam.
- The hydroelectric power plant of Machadinho, located in the Southern region.
- The hydroelectric power plant of Estreito, located in the Northern region.
- The small hydroelectric power plants of Glória and Nova Maurício, under divestment process, located in the Southern region.

Through our 55% participation in Aliança Geração de Energia S.A. ("Aliança Geração"), we also have indirect stakes in the hydroelectric power plants of Igarapava, Porto Estrela, Funil, Candonga, Aimorés, Capim Branco I, Capim Branco II, located in the Southeastern Region and, additionally, we have indirect stake in Santo Inácio, a Wind Complex located in the Brazilian state of Ceará, which started operations in December 2017. Part of the electricity generated by these assets is supplied to our operations through power purchase agreements with Aliança Geração.

We also have a 4.59% indirect stake in Norte Energia S.A. ("Norte Energia"), through our 51% stake in Aliança Norte Energia, a joint venture with Cemig Geração e Transmissão S.A. Norte Energia is the company established to develop and operate the Belo Monte hydroelectric plant in the Brazilian state of Pará, which started operations in April 2016 and accomplished the start-up of the last of its 24 turbines in 2019. Our participation in the Belo Monte project gives us the right to purchase 9% of the electricity generated by the plant, which has already been contracted through a long-term power purchase agreement with Norte Energia.

In order to achieve 100% renewable electricity in Brazil by 2025 and increase renewable energy sources, in addition to the Sol do Cerrado project, which we have announced in December 2020, we signed a long-term energy supply contract for 20 years. Under this long-term agreement, energy will be supplied by the Folha Larga Sul wind farm, a 151.2 MW project in Campo Formoso, Bahia, Brazil. This project started commercial operation in the second half of 2020. The agreement also includes a future asset call option held by us. In 2019, we also approved the construction of two wind farms (Gravier and Acauã) in the Brazilian states of Ceará and Rio Grande do Norte, respectively, through Aliança Geração. Projects have together 180.6 MW of installed capacity and will begin commercial operations by 2022.

In order to avoid high energy costs and shortages, in addition to investing in self-owned power plants and entering into long term power purchase agreements, in 2021 we started partnerships to use battery energy storage systems in our operations in Sudbury, Canada, and at the maritime terminal on Guaíba Island, Brazil.

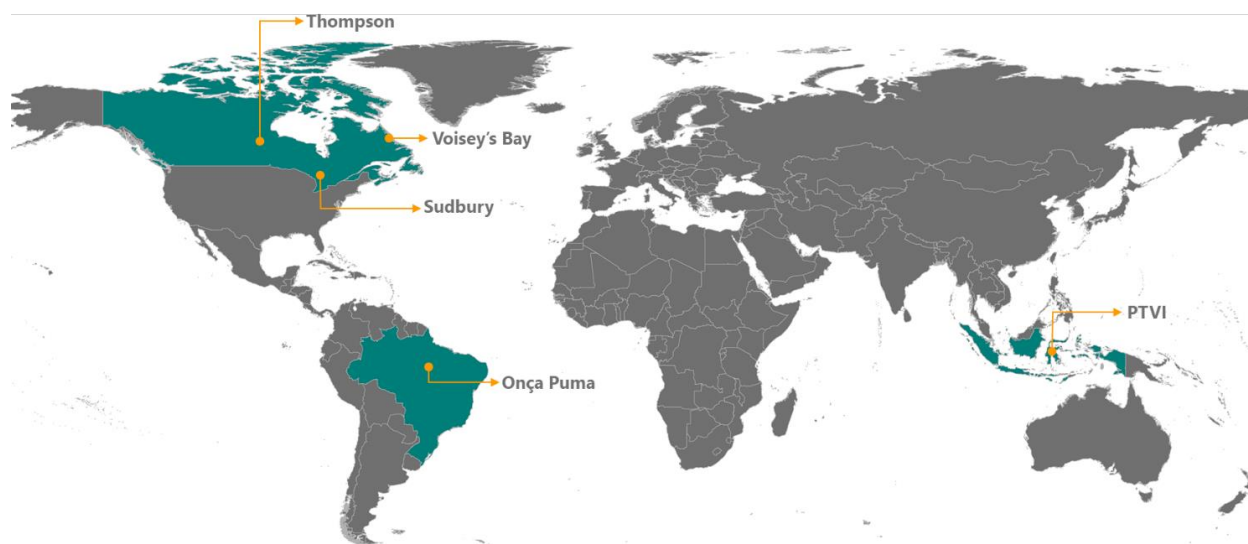
2. Base metals

2.1 Nickel

2.1.1 Properties

We conduct our nickel operations primarily through three regional production systems. Our wholly owned subsidiary Vale Canada operates two nickel production systems: (i) the North Atlantic region which encompasses Canada and the United Kingdom and (ii) the Asia-Pacific region which encompasses Indonesia and Japan. The third nickel production system is in our South Atlantic region in Brazil. We also produce copper as a coproduct and cobalt, PGMs, gold and silver as byproducts in our nickel operations in Canada.

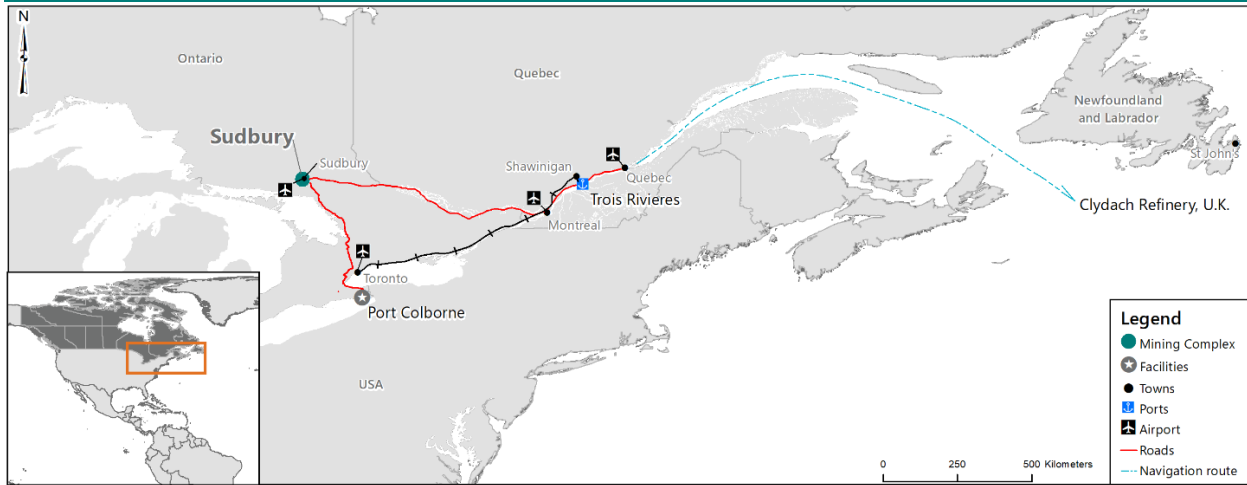
Our nickel operations are set forth in the following tables.



NICKEL OPERATIONS AND PROJECTS

NORTH ATLANTIC OPERATIONS

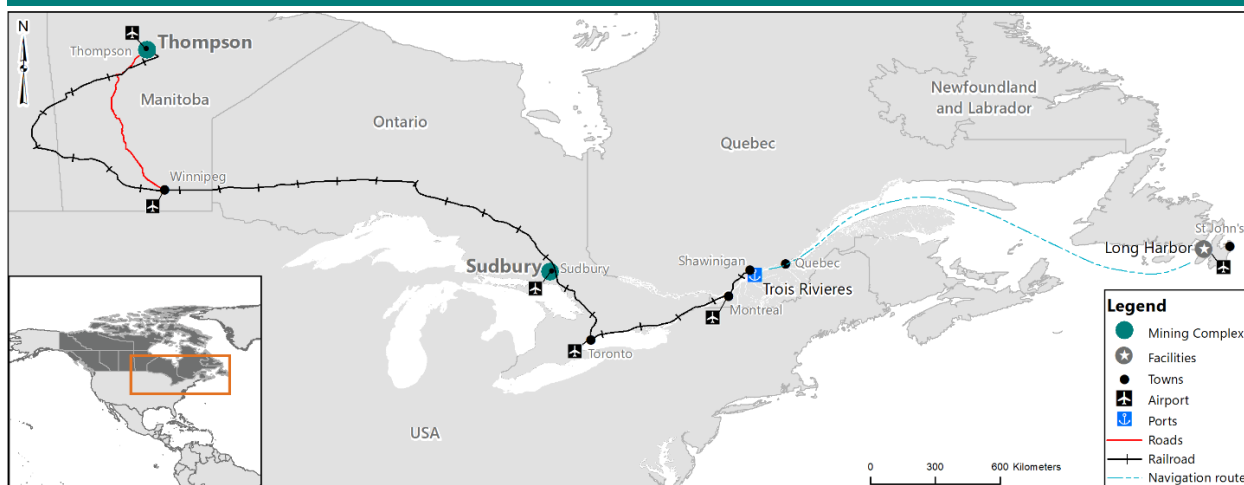
SUDBURY



Ownership interest	100%
Location	Ontario, Canada
Operator	Vale Canada
Mineral titles ⁽¹⁾	<ul style="list-style-type: none"> - Patented mineral rights with no expiration date. - Mineral leases expire between 2022 and 2042. - Mining licenses of occupation with renewable terms. We can continue to operate during the renewal process. Acreage: 8,437 ha
Stage/ Operations	Production stage since 1885. Integrated underground/open pit mining, milling, smelting and refining operations
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	Nickel and copper. Primarily underground mining operations with nickel sulfide ore bodies, which also contain some copper, cobalt, PGMs, gold and silver.
Associated facilities and infrastructure	<p>Processing plants: Milling, smelting and refining facilities. In Ontario, we also process external feeds from third parties and from our Thompson operation. Raw materials from our Sudbury Operations are shipped to our Port Colborne Refinery for processing where nickel and cobalt products from the refineries (Copper Cliff Nickel Refinery - CCNR and Long Harbour - LH) are received, treated and/or packaged. In addition to producing finished nickel in Sudbury, we ship a nickel oxide intermediate product to our nickel refinery in Clydach, Wales, United Kingdom for processing to final products.</p> <p>Other facilities: Waste and tailings disposal structures.</p> <p>Logistics: Plants are located by the Trans Canada highway and two major railways that pass through the Sudbury area. Finished products are delivered to the North American market by truck and rail. For overseas customers, the products are loaded into containers and travel intermodally (truck/rail/containership) through Canadian ports (Quebec, Trois Rivières) bulk material (Copper Concentrate) is sold directly to market and is shipped bulk via Canadian port (Quebec, Trois Rivières)</p> <p>Energy: Supplied by Ontario's provincial electricity grid and produced directly by Vale Canada via hydro generation.</p>

⁽¹⁾ Mining titles area illustrated are limited to those where we have reserves and resources associated.

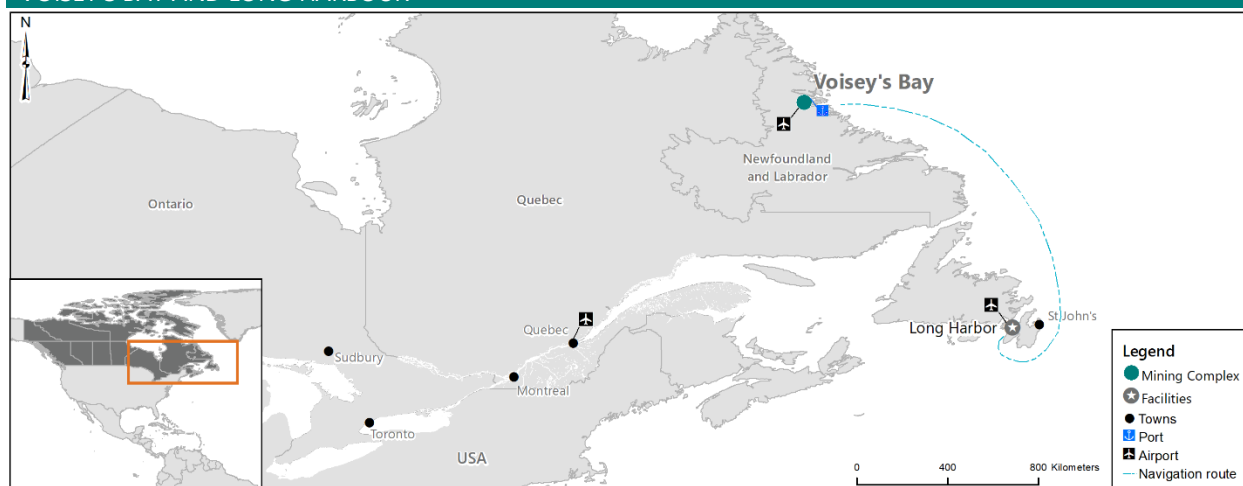
THOMPSON



Ownership interest	100%
Location	Thompson, Manitoba, Canada
Operator	Vale Canada
Mineral titles ⁽¹⁾	<ul style="list-style-type: none"> - Mining Claim Leases (MCL) are in good standing and expire between 2021 and 2025. - Transition Agreement with the government of Manitoba will renew MCLs to Mineral Leases, with renewable terms of 21 years. We can continue to operate during the renewal process. <p>Acreage: 1,793 ha.</p>
Stage/ Operations	Production stage since 1961. Integrated underground mining and milling operations.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	Nickel. Primarily underground mining operations with nickel sulfide ore bodies, which also contain some copper, PGMs and cobalt.
Associated facilities and infrastructure	<p>Processing plant: Since the second half of 2018, we have started sending the majority of the nickel concentrate from Thompson to be processed in Sudbury. Since the second half of 2021, we have started sending most of the nickel concentrate from Thompson to be processed at the Long Harbour facility, however the material will sometimes be directed to Sudbury, pending the requirements of the operations.</p> <p>Other facilities: Waste and tailings disposal structures.</p> <p>Logistics: From Thompson, the nickel concentrate is trucked to Winnipeg (Manitoba) or railed to Sudbury (Ontario) or Trois-Rivieres, (Quebec). From Winnipeg the material is railed to Sudbury or Trois-Rivieres. Material stored at the port of Trois-Rivieres is loaded aboard a ship for the final destination of Long Harbour Newfoundland & Labrador) for processing.</p> <p>Energy: Hydro-electric power supplied by Manitoba's provincial utility company</p>

⁽¹⁾ Mining titles area illustrated are limited to those where we have resources associated.

VOISEY'S BAY AND LONG HARBOUR

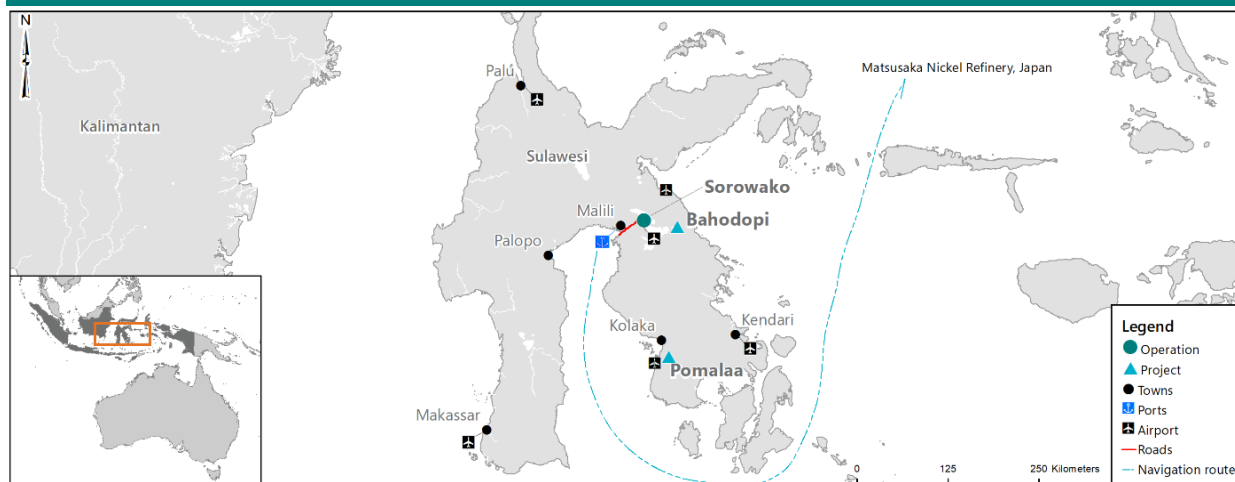


Ownership interest	100%
Location	Newfoundland and Labrador, Canada
Operator	Vale Newfoundland & Labrador Limited which is wholly owned by Vale Canada
Mineral titles ⁽¹⁾	Mining lease expiring in 2027 with a right of further renewals for 10-year periods. Acreage: 1,595 ha
Stage/ Operations	Production stage since 2005. Integrated mining and milling operation at Voisey's Bay producing nickel and copper concentrates. In 2022, the Voisey Bay Expansion Project which provides access to two underground deposits is scheduled to be completed.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	Nickel and copper. Open pit and primarily underground mining operations with nickel sulfide ore bodies, which also contain some copper and cobalt.
Associated facilities and infrastructure	Processing plant: Refining of nickel concentrate from Voisey's Bay Labrador at our Long Harbour, Newfoundland complex which produces finished metal products with an expected nominal capacity of approximately 50,000 metric tons of refined nickel per year. The Long Harbour facility is processing feed from Voisey's Bay concentrate, and in the second half of 2021 began processing additional feed from Thompson, Manitoba. Copper concentrate from the Voisey's Bay mines is sold directly to the market. Other facilities: Waste and tailings disposal structures. Logistics: The copper and nickel concentrates from Voisey's Bay are transported to the port by haulage trucks and then shipped by dry bulk vessels to either overseas markets (copper) or to our Long Harbour facilities (nickel) for further processing. Thompson feed is shipped by rail and vessels to Long Harbour for processing. Energy: Power at Voisey's Bay is 100% supplied through Vale-owned diesel generators. Power at the Long Harbour refinery is supplied by the Newfoundland and Labrador provincial utility company.

⁽¹⁾ Mining titles area illustrated are limited to those where we have reserves and resources associated.

ASIA/PACIFIC OPERATIONS

PTVI

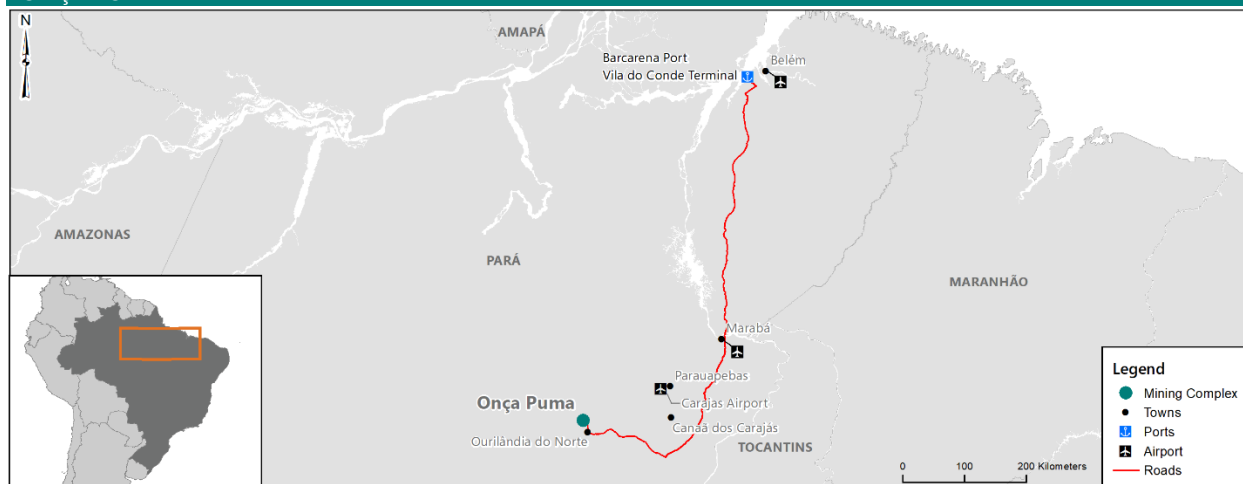


<p>Ownership interest</p>	<p>Owned by PT Vale Indonesia Tbk (“PTVI”). We indirectly hold 44.34% of PTVI (Sumitomo Metal Mining (“Sumitomo”) holds 15.03%, PT Indonesia Asahan Aluminium (Persero) (“Inalum”) holds 20%, Sumitomo Corporation holds 0.14% and the public holds 20.49%).</p>
<p>Location</p>	<ul style="list-style-type: none"> - Sorowako - South Sulawesi Province. - Bahodopi 2/3 Central Sulawesi Province. - Pomalaa Southeast Sulawesi Province.
<p>Operator</p>	<p>PTVI</p>
<p>Mineral titles⁽¹⁾</p>	<p>Contract of Work expires in 2025, with right to two consecutive ten-year extensions. Acreage: 118,017ha</p>
<p>Stage/ Operations</p>	<p>Sorowako: Production stage since 1978 and engages in mining and value-added smelting activities in the production of Nickel matte. Bahodopi and Pomalaa: Exploration Stage</p>
<p>Key permit conditions</p>	<p>We have or expect to obtain in a timely manner the necessary permits for operations.</p>
<p>Mine types and mineralization styles</p>	<p>Nickel laterite open pit mining which also contains cobalt.</p>
<p>Associated facilities and infrastructure</p>	<p>Processing plant: PTVI mines nickel laterite ore and produces nickel matte, which is shipped primarily to our nickel refinery in Japan. Pursuant to life of mine off take agreements, PTVI sells part of its production to Vale Canada (currently, 80%) and part of Sumitomo (currently 20%). Vale Canada annual share of the offtake of PTVI may change based on the total production of PTVI. Other facilities: Waste disposal structures. Logistics: PTVI nickel matte product is trucked approximately 55 km to the river port at Malili and then loaded onto barges Energy: Produced primarily by PTVI’s low-cost hydroelectric power plants on the Larona River (there are currently three facilities). PTVI has thermal generating facilities to supplement its hydroelectric power supply with a source of energy that is not subject to hydrological factors.</p>

⁽¹⁾ Mining titles area illustrated are limited to those where we have reserves and resources associated

SOUTH ATLANTIC OPERATIONS

ONÇA PUMA



Ownership interest	100%
Location	Pará, Brazil
Operator	Vale S.A.
Mineral titles ⁽¹⁾	Mining concession with no expiration date. Acreage: 14,787 ha
Stage/ Operations	Production stage since 2011. Mining and smelting operation producing a high-quality ferronickel for application within the stainless steel industry.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	Nickel laterite deposit, open pit mining.
Associated facilities and infrastructure	Processing plant: The operation produces ferronickel via a rotary kiln electric furnace process. We are currently operating a single line with one electric furnace and two lines of calcine and rotary kilns, with nominal capacity estimated at 27,000 metric tons per year. We will evaluate opportunities to rebuild the second line operations considering market conditions and the associated business case. See Additional Information—Legal proceedings— <i>Legal proceedings seeking suspension of certain operations in the state of Pará—Onça Puma litigation.</i> Other facilities: Waste and tailings disposal structures. Logistics: The ferro nickel is transported by truck to the Vila do Conde maritime terminal in the Brazilian state of Pará and exported in ocean containers. Energy: Supplied through the national electricity grid. Produced directly by our power plants or acquired through power purchase agreements

⁽¹⁾ Mining titles area illustrated are limited to those where we have reserves and resources associated

NICKEL REFINERIES



Long Harbour, Port Colborne and Copper Cliff are described as part of Canadian operations summary above.

	CLYDACH	MATSUSAKA	KAOSIUNG ⁽¹⁾	DALIAN ⁽¹⁾
Ownership interest	100%	We own 87.2% of the shares, and Sumitomo owns the remaining shares.	100%	We own 98.3% of the equity interest and Ningbo Sunhu Chemical Products Co., Ltd. owns the remaining 1.7%.
Location	Clydach, Wales (U.K.)	Matsusaka, Japan	Kaohsiung, Taiwan	Liaoning, China
Operator	Vale Europe Limited	Vale Japan Limited	Vale Taiwan Limited	Vale Nickel (Dalian) Co., Ltd
Capacity	Standalone nickel refinery (producer of finished nickel), with nominal capacity of 40,000 metric tons per year.	Standalone nickel refinery (producer of intermediate and finished nickel), with a nominal capacity of 60,000 metric tons per year for intermediate nickel products (for finished nickel product capacity the estimated capacity is 30,000 mt).	Standalone nickel refinery (produced finished nickel), with nominal capacity of 18,000 metric tons per year.	Standalone nickel refinery (produced finished nickel), with nominal capacity of 32,000 metric tons per year.
Operations	Processes a nickel intermediate product, nickel oxide, supplied from our Sudbury and Matsusaka operations to produce finished nickel in the form of powders and pellets.	Produces intermediate products for further processing in our refineries in the UK, and Canada, and finished nickel products using nickel matte sourced from PTVI.	Produced finished nickel for the stainless-steel industry, primarily using intermediate products from our Matsusaka operations. We suspended operations at this plant in 2017 due to market conditions and it currently remains under care and maintenance.	Produces finished nickel for the stainless steel industry, primarily using intermediate products from our Matsusaka operations. We suspended operations at this plant in 2020 and signed a purchase agreement for the sale of the plant in December 2021, with closing of the sale expected during 2022.
Energy	Supplied through the national electricity grid.	Supplied through the national electricity grid. Acquired from regional utility companies.	Supplied through the national electricity grid. Acquired from regional utility companies.	Supplied through the national electricity grid. Acquired from regional utility companies.
Logistics	Transported to final customer in the UK and continental Europe by truck. Products for overseas customers are trucked to the ports of Southampton and Liverpool and shipped by ocean container.	Products trucked over public roads to customers in Japan. For overseas customers, the product is loaded into containers at the plant and shipped from the ports of Yokkaichi and Nagoya.	Trucked over public roads to customers in Taiwan. For overseas customers, the product is loaded into containers at the plant and shipped from the port of Kaohsiung.	Product transported over public roads by truck and by railway to customers in China and shipped in ocean containers to overseas and some domestic customers.

(1) Currently in care and maintenance.

2.1.2 Production

The following table sets forth our annual mine production by operating mine (or, on an aggregate basis in the case of the Sulawesi operating areas operated by PTVI in Indonesia, because it is organized by mining areas rather than individual mines) and the average percentage grades of nickel and copper. The mine production at Sulawesi represents the product from PTVI's screening station delivered to PTVI's processing plant and does not include nickel losses due to drying and smelting. For our Sudbury, Thompson and Voisey's Bay operations, the production and average grades represent the run-of-mine delivered to those operations' respective processing plants and do not include adjustments due to beneficiation, smelting or refining. For our Onça Puma operation in Brazil the production and average grade represents in-place ore production and does not include losses due to processing.

	2021 ⁽¹⁾			2020 ⁽¹⁾			2019 ⁽¹⁾		
	Production	Grade		Production	Grade		Production	Grade	
		Cu	Ni		Cu	Ni		Cu	Ni
<i>Sudbury, Ontario</i>									
Copper Cliff North	468	1.57	1.26	580	1.49	1.30	644	1.72	1.38
Creighton	330	2.76	2.59	508	2.78	2.60	613	2.67	2.68
Garson	410	1.14	1.39	485	1.05	1.52	641	1.32	1.77
Coleman	664	3.33	1.36	1,038	3.41	1.43	1,102	3.80	1.47
Totten	256	1.59	1.18	637	1.83	1.31	669	2.08	1.33
Ontario - total	2,129	2.22	1.51	3,248	2.30	1.58	3,669	2.50	1.68
<i>Manitoba</i>									
Thompson	646	-	1.85	691	-	1.93	859	-	1.78
<i>Voisey's Bay</i>									
Ovoid	2,061	1.07	2.04	1,588	1.16	2.19	2,116	1.19	2.21
<i>Indonesia</i>									
Sorowako ⁽²⁾	4,149	-	1.79	4,163	-	1.82	4,286	-	1.89
<i>Brazil</i>									
Onça Puma ⁽³⁾	2,016	-	2.11	3,429	-	1.58	321	-	1.40

(1) Production is stated in thousands of metric tons. Grade is % of copper or nickel, respectively.

(2) These figures correspond to 100% production and are not adjusted to reflect our ownership. We own a 44.34% interest in PTVI.

(3) Mining activities in Onça Puma were suspended from September 2017 through September 2019.

The following table sets forth information about our nickel production, including: nickel refined through our facilities and intermediates designated for sale. The numbers below are reported on a contained nickel ore-source basis.

Mine	Type	Finished production by ore source for the year ended December 31,		
		2021	2020	2019
<i>(thousand metric tons contained nickel)</i>				
Sudbury	Underground	32.18	43.28	50.80
Thompson	Underground	5.88	10.60	11.27
Voisey's Bay ⁽¹⁾	Open pit/Underground	38.13	35.70	35.36
Sorowako ⁽²⁾	Open cast	65.4	72.2	71.00
Onça Puma	Open pit	19.07	16.00	11.64
External ⁽³⁾	-	6.05	6.59	7.33
Total⁽⁴⁾		168.04	183.73	184.61

(1) Includes finished nickel produced at Long Harbour.

(2) These figures have not been adjusted to reflect our ownership. We own a 44.34% interest in PTVI.

- (3) Finished nickel processed at our facilities using feeds purchased from unrelated parties.
- (4) These figures do not include tolling of feeds for unrelated parties.

2.1.3 Individual property disclosure

We consider Sudbury to be a material property, for purposes of S-K 1300.

2.1.3.1 Sudbury

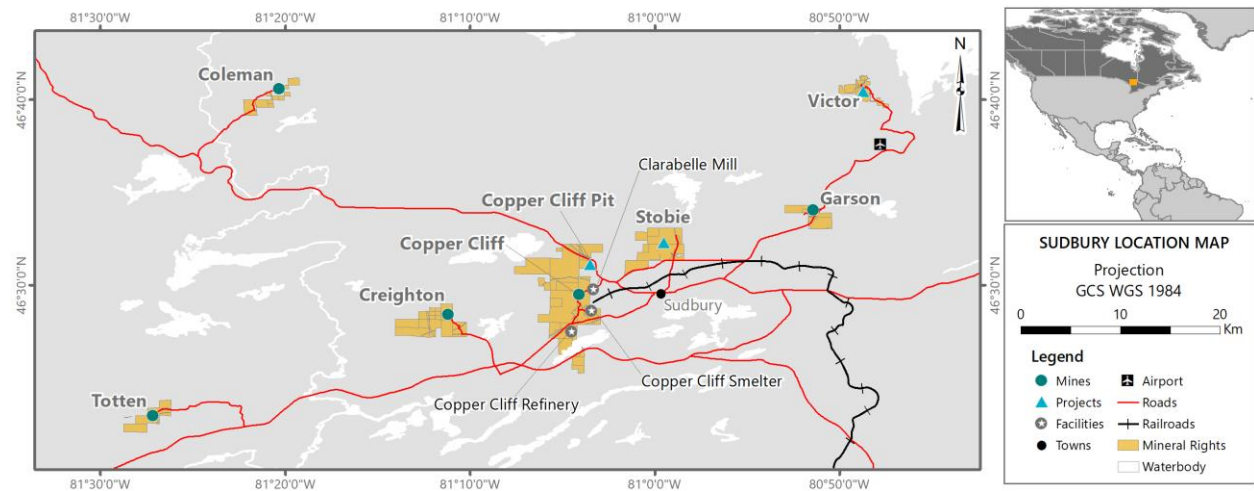
Property Description

The Sudbury property is located in the Greater City of Sudbury, which is approximately 330 km North–Northeast of the city of Toronto in the Province of Ontario, as illustrated below. Our Sudbury operations consist of:

- Production stage underground mines (Coleman, Copper Cliff, Creighton, Garson, Totten), a non-operating mine (Stobie), with exploration stage and non-producing deposits.
- Processing and refining capabilities are a combination of facilities in Sudbury (Clarabelle Mill, Copper Cliff Smelter and Nickel Refinery), Port Colborne Nickel Refinery, which is located in in Port Colborne, Ontario, about 160 km from Toronto, Ontario.

The following table shows the locations of the central mass point of the Sudbury Operations in WGS 1984 datum

Mine	Latitude (north)	Longitude (west)
Coleman	46°40'37.0	81°20'21.2
Copper Cliff	46°29'29.0	81°04'05.0
Creighton	46°28'23.7	81°04'05.0
Garson	46°34'02.9	80°51'26.4
Copper Cliff Pit	46°31'05.4	81°03'30.2
Stobie	46°32'15.3	80°59'31.1
Totten	46°22'55.2	81°27'09.8
Victor	46°40'26.8	80°48'44.2



Infrastructure

The Sudbury operations currently have all infrastructure in place to support mining and processing activities.

Our operations in Sudbury have a 120-year history of mining in the region, and we possess a highly skilled and trained workforce as well as sophisticated local goods and service providers to support our mining operations. Multiple transportation routes access the Sudbury area inclusive of air, rail and vehicle transport. Access to the various mine and deposit sites is through a system of numbered municipal roads and roads operated by us.

Electrical power for the Sudbury operations is primarily sourced from grid supply (approximately 80%). In Sudbury, all incoming grid-connected power and hydroelectric generation is distributed to mines and processing plants through our electrical distribution network, consisting of 69 kV distribution power lines, substations, transformers, breakers, disconnects and other electrical equipment. This distribution system is owned, operated, and maintained by us.

A portion of the demand is met by our hydroelectric power facilities. We consume 100% of our self-generated and produced hydro generation behind-the-meter, *i.e.*, we do not inject power onto the Ontario grid. The hydroelectric facilities have a nameplate capacity of 55 MW.

Process water for Clarabelle Mill is sourced from water recycled from the tailings complex. Mines depend on the Vermilion River water intake which is owned and operated by us. The intake pumps raw water from the river to Creighton where it is treated at the Vermilion water treatment plant. After treatment, water is supplied to mines in the Sudbury area, Clarabelle Mill, Copper Cliff Smelter, and Copper Cliff Refinery.

Geology and Mineralization

Deposits within the Sudbury Igneous Complex (SIC) are examples of nickel–copper mineralization related to magnetism following a meteorite impact. The SIC is exposed as an elliptical ring with a northeast-trending long axis of approximately 72 km and a short axis of approximately 27 km. The Sudbury deposits host three principal styles of mineralization: Contact-style, Offset-style, Footwall style. However, the three mineralization environments can be quite variable, transitional, and many exhibit characteristics fitting more than one mineralization environment description.

Exploration

The first exploration activities date back to 1856 when nickel was first discovered. Over the years different exploration activities have been carried out, including geological mapping, drilling, ore control field sampling and geophysics. We continually invest in mineral exploration with the aim of expanding our mineral resources and mineral reserves and to achieve an adequate level of confidence in the resource estimate that supports our mining plans.

Mineral Rights

Our landholdings in the area include: mining claims, mining leases, patented claims, and mining licenses of occupation. The total Mineral Rights area of the MRMR footprint is 163 Patented Licenses, approximately 8,437 ha. Vale holds Mineral Rights in Ontario under the following offered license types: 10 Year Mining Lease, 21 Year Mining Lease, Mining Claim, Mining License of Occupation. Each of these license types are subject to terms, applicable fees and/or penalties as defined by their current expiry dates, and/or if said expiry dates are properly renewed or breached as per definition in the Provincial Mining Act of Ontario. We also have mineral rights outside of the defined MRMR footprint held under various license titles listed above. These licenses and their mineral rights are kept in good standing with exploration expenditures or where applicable cash in lieu of expenditures.

Surface rights

We hold sufficient surface rights for the current life of mine. In the Sudbury district, we are the registered owner of mining rights and surface rights or a combination of both shown as fee simple lands, mining leased lands, mining license of occupation lands and unpatented mining claims.

Current, planned, future mining plans

Mines are owner-operated and use conventional equipment. The current extraction methods used in underground mining are conventional bulk stoping or narrow vein cut-and-fill mining methods, depending on the mine and geological setting. As part of the long-term strategy and continuous pursuit to add value to the company, by bringing

operational reliability, expanding mineral resources and reserves portfolio and development of additional future production capacity we continually invest in mineral exploration.

Asset details and modernization

Over the years, current and previous owners have invested capital to modernize the property, and we now have equipped some of our mines with a wireless network underground, automated equipment in our plants, electrical vehicles are being commissioned and some of the latest in equipment innovation in blast free mechanical rock excavation machines are being tested in Sudbury. A robust equipment and infrastructure replacement program ensures that equipment manufacturer recommendations for life of asset are followed, and key parts refurbished or replaced when required. When the useful life of equipment is done, we plan and invest in upgraded equipment. Our underground development is maintained through robust ground control monitoring programs – with ground support re-installed or new headings driven when necessary.

Total property book value

The book value of the property and its associated plant and equipment was US\$7,674 million as of December 31, 2021, which does not include goodwill for base metal operations.

Operator history

The Sudbury, Ontario operations have over 120 years of active mining history, and exploration activities that date back to 1856 when nickel was first discovered. Various company names are documented in Ontario's history such as the Canadian Copper Company of Cleveland, Mond Nickel company, International Nickel Company, Ltd. (joint venture by the Canadian Copper Company, Orford Copper Company and American Nickel Works. Nickel refinery at Clydach, Wales constructed by the Mond Nickel Company) and the British American Nickel Corporation. In 1975, Inco became the formal name of the International Nickel Company of Canada, Limited and in 2006 CVRD obtained ownership of Inco. CVRD rebranded itself to Vale and CVRD–Inco changed its name to Vale Inco and in 2010, Vale Inco changed its name to Vale Canada.

Encumbrances and permitting requirements

There are no known encumbrances on the property, considering the part of the property with reserves or resources associated.

Reserves and resources

The mineral resources and reserves in Ontario are shown as of year ending 2021. For each table, the price, timeframe and point of reference used, when estimating mineral resources and reserves are highlighted.

Mineral resource estimate

After a comprehensive lithological and mineralization characterization the domain wireframes were constructed using data from surface and underground drill holes that had different age periods, ranging from discovery-style drilling to exploration and infill drill programs.

A capping for precious metal outliers were applied considering individual deposit characteristics.

Grade estimation was conducted using ordinary kriging (OK), with search distances based on variography and using unfolding techniques for the majority of the deposits to compensate for changes in geometry. The models were typically estimated in three successive passes. The block size generally represents the optimal selective mining units (SMU), and varies by deposit/zone. Blocks estimates were validated using industry standard validation techniques.

The mineral resource confidence categories were initially assigned based on a combination of factors, including geological understanding and confidence, drill hole support, grade estimation confidence relative to planned production rates, and identified risk factors. The initial assignments were reviewed to assess the impacts of factors such

as metallurgical recoveries, geomechanical studies, mine design work, and representative mineability and recovery reconciliation analysis.

For each resource estimate, at minimum an initial assessment level of study was undertaken that assessed likely infrastructure, mining, and process plant requirements; mining methods; process recoveries and throughputs; environmental, permitting and social considerations relating to the proposed mining and processing methods, and proposed waste disposal, and technical and economic considerations in support of an assessment of reasonable prospects of economic extraction. All material is assumed to be blended at the Clarabelle Mill, and milling throughput rates will depend on the blending strategy in place at the mill at the time the material is processed.

The resources are reported at varying cut-off values, which are based primarily on the mining method that will be used.

All disclosure of mineral resources is exclusive of mineral reserves.

Sudbury - Summary of Nickel, Cobalt, Copper, PGMs and Gold Mineral Resources as of December 31, 2021 (1)(2)									
Category	2021 ⁽³⁾							Cut-off grade ⁽⁴⁾	Metallurgical recovery ⁽⁴⁾
	Tonnage	Ni	Co	Cu	Pt	Pd	Au		
Measured	7.3	1.24	0.05	0.93	0.51	0.61	0.20	NSR – 3.4–231 US\$/Ton 3.25% CuEq 0.50% NiEq	Ni -75-85% Cu – 85-95% Co-20-30% Pt 70-75% Pd 70-80% Au 60-75%.
Indicated	50.5	1.59	0.04	2.19	0.92	1.17	0.38		
Measured + Indicated	57.9	1.54	0.04	2.04	0.87	1.10	0.35		
Inferred	8.6	2.1	0.05	2.5	1.5	1.8	0.6		

- (1) The mineral resource reasonable prospects of economic extraction were determined using the following price ranges: nickel US\$13,376-18,000/t, copper US\$5,250-7,000/t, cobalt US\$27,500-45,000/t, platinum US\$1,150-1,225/oz, palladium US\$750-1,093/oz, gold US\$1,200-1,373/oz, depending on the deposit. For each deposit, mineral resource prospect of economic extraction was determined based on a commodity price assumption established at the time of mine design. The commodity price assumption for each deposit continues to provide a reasonable basis for establishing the prospects of economic extraction for mineral resources estimated at this deposit as of December 31, 2021.
- (2) Resources are reported on a 100% basis, as operations are entirely owned by us.
- (3) Tonnage is in millions of dry metric tons. Cu, Ni, Co grades are in (%), Pt, Pd and Au grades are in g/t. Point of reference of the estimate is in situ.
- (4) Cut-off grade, metallurgical recovery, pricing data is shown as ranges, due to the variability in specific orebody requirements and timing of the associated estimate.

Mineral reserves estimate

For a discussion of the changes from the previous fiscal year, see "Reserves and Resources."

Sudbury - Summary of Nickel, Cobalt, Copper, PGMs and Gold Mineral Reserves as of December 31, 2021 (1)(2)																
Category	2021 ⁽³⁾							2020 ⁽³⁾							Cut-off grade ⁽⁴⁾	Metallurgical recovery ⁽⁴⁾
	Tonnage	Ni	Co	Cu	Pt	Pd	Au ⁽⁵⁾	Tonnage	Ni	Co	Cu	Pt	Pd	Au ⁽⁵⁾		
Proven	18.9	1.51	0.04	1.94	1.22	1.19	0.51	15.8	1.58	0.04	2.11	1.31	1.29	0.49	US\$69-235/ton	Ni -75-85% Cu – 85-95% Co-20-30% Pt 70-75% Pd 70-80% Au 60-75%
Probable	35.0	1.24	0.03	1.40	1.12	1.49	0.39	35.2	1.30	0.04	1.41	1.14	1.44	0.41		
Total	53.8	1.33	0.04	1.59	1.16	1.38	0.43	51.1	1.39	0.04	1.63	1.19	1.39	0.43		

- (1) The mineral reserve economic viability was determined based on a long-term price of per metric ton of US\$18,000 for nickel, US\$7,500 for copper, US\$50,000 for cobalt. US\$/oz platinum US\$1,200, palladium US\$1,400, and gold US\$1,450.
- (2) Reserves are reported on an 100% basis, as operations are entirely owned by us.
- (3) Tonnage is in millions of dry metric tons. Ni, Cu, Co grades are in (%), Pt, Pd and Au grades are in g/t. The point of reference is the point of delivery to the process plant.
- (4) Cut-off, metallurgical recovery, pricing data is shown as ranges, due to the variability in specific orebody requirements and timing of the associated estimate
- (5) Figures shown do not deduct the streaming amounts. For a description of our streaming arrangement with Wheaton, see Section 2.3 PGM's and other Precious Metals.

2.1.4 Customers and sales

Our nickel customers are broadly distributed on a global basis. In 2021, 36.5% of our refined nickel sales were delivered to customers in Asia, 27.8% in Europe, 33.5% in North America and 2.2% in other markets. We have short-term fixed-volume contracts with customers for the majority of our expected annual nickel sales. These contracts generally provide stable demand for a significant portion of our annual production. Also, we have a long-term agreement to sell our Class I nickel to the North Atlantic electric vehicle market.

Nickel is an exchange-traded metal, currently listed on the London Metal Exchange (“LME”) and Shanghai Futures Exchange (“SHFE”), and most nickel products are priced according to a discount or premium to the LME price, depending primarily on the nickel product’s physical and technical characteristics. Our finished nickel products represent what is known in the industry as “primary” nickel, meaning nickel produced principally from nickel ores (as opposed to “secondary” nickel, which is recovered from recycled nickel-containing material). Finished primary nickel products are distinguishable in terms of the following characteristics, which determine the product price level and the suitability for various end-use applications:

- nickel content and purity level: (i) intermediates have various levels of nickel content, (ii) nickel pig iron has 1.5-15% nickel, (iii) ferro-nickel has 15-40% nickel, (iv) refined nickel with less than 99.8% nickel, including products such as Tonimet™ nickel, (v) standard LME-grade nickel has a minimum of 99.8% nickel, and (vi) high-purity nickel has a minimum of 99.9% nickel and does not contain specific elemental impurities;
- shape (such as discrete or filamentary powders, pellets, discs, squares and strips);
- size (from micron powder particles to large full-sized cathodes); and
- packaging (such as bulk, 2-ton bags, 250 kg drums, 10 kg bags).

In 2021, the principal first-use applications for primary nickel were:

- stainless steel (69% of global nickel consumption);
- non-ferrous alloys, alloy steels and foundry applications (12% of global nickel consumption);
- nickel plating (6% of global nickel consumption);
- batteries (11% of global nickel consumption); and
- others (2% of global nickel consumption).

In 2021, 80% of our refined nickel sales were made into non-stainless steel applications, compared to the industry average for nickel producers of 31%. This brings more diversification and sales volume stability to our nickel revenues. As a result of our focus on higher-value segments, our average realized nickel prices for refined nickel have typically exceeded LME cash nickel prices.

We offer sales and technical support to our customers on a global basis through an established marketing network headquartered at our head office in Toronto (Canada). We have a well-established global marketing network for finished nickel with sales and technical support distributed around the world with presence in Singapore and Toronto (Canada) and have sales managers located in St. Prex (Switzerland), Paramus, New Jersey (United States) and at several locations throughout Asia. For information about demand and prices, see *Operating and Financial Review and Prospects—Overview—Major factors affecting prices*.

2.1.5 Competition

The global nickel market is highly competitive. Our key competitive strengths include our long-life mines, sophisticated exploration and processing technologies, and a diversified portfolio of products. Our global marketing reach, diverse product mix, and customer technical support direct our products into applications and geographic regions that offer the highest margins for our products.

Our nickel production represented 6.1% of global consumption for primary nickel in 2021. In addition to us, the largest mine-to-market integrated suppliers in the nickel industry (each with its own integrated facilities, including nickel mining, processing, refining and marketing operations) are Nornickel, Glencore, Jinchuan Nonferrous Metals Corporation, Tsingshan Group and Jiangu Delong Nickel. Together with us, these companies accounted for about

45.2% of global refined primary nickel production in 2021.

The quality of nickel products determines its market suitability. Upper Class I products, which have higher nickel content and lower levels of deleterious elements, are more suitable for high-end nickel applications, such as the growing electric vehicle market (batteries) and utilization in specialty industries (e.g., aircraft and spacecraft) and draw a higher premium. Lower Class I products have slightly higher levels of impurities compared to Upper Class I products and are suitable for more general nickel applications, such as foundry alloys and generally receive a lower premium compared to Upper Class I products. Class II products, which have lower nickel content and higher levels of deleterious elements, are mostly used in the making of stainless steel. Intermediate products do not represent finished nickel production and are generally sold at a discount given that they still need to be processed before being sold to end customers.

Much of the world nickel production is composed of Class II nickel products (62% of the global market in 2021), which include nickel pig iron (NPI) and ferro nickel (with nickel content under 99%). Most of our products are high quality nickel products, which makes us the supplier of choice for specialty nickel applications. In 2021, 68% of our nickel products were Class I, 24% were Class II and 8% were Intermediates.

While stainless steel production is a major driver of global nickel demand, stainless steel producers can obtain nickel with a wide range of nickel content, including secondary nickel (scrap). The choice between primary and secondary nickel is largely based on their relative prices and availability. See *Operating and Financial Review and Prospects—Overview—Major factors affecting prices—Nickel*.

Competition in the nickel market is based primarily on quality and reliability of supply and price. We believe our operations are competitive in the nickel market because of the high quality of our nickel products.

2.2 COPPER

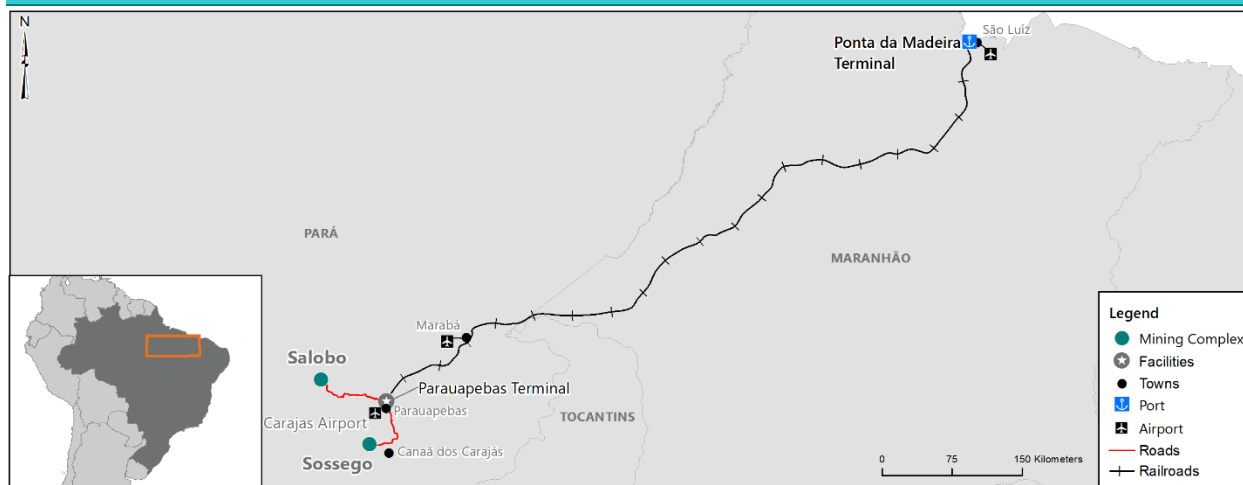
2.2.1 Properties

We conduct our copper operations primarily through our parent company Vale S.A. and our wholly owned subsidiary Salobo Metais S.A. in Brazil, and through our subsidiary Vale Canada in Canada.



COPPER OPERATIONS & PROJECTS

BRAZIL

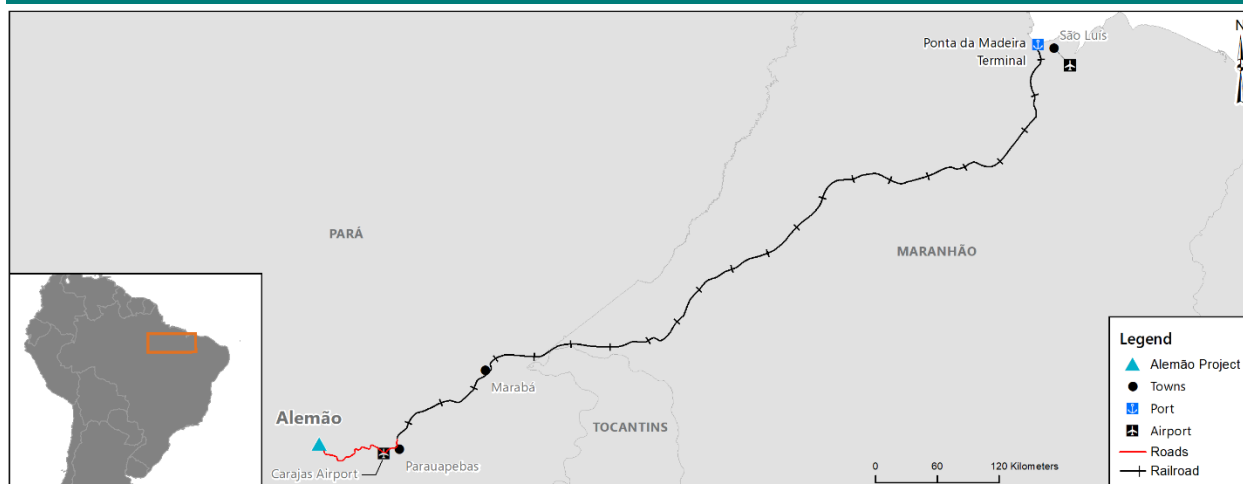


SOSSEGO

Ownership interest	100%
Location	Carajás, State of Pará, Brazil.
Operator	Vale S.A.
Mineral titles ¹	Mining concession and application for mining concession with no expiration date. Acreage: 117,508.39 ha
Stage/ Operations	Production stage since 2004. Two main open pits (Sossego and Sequerinho) and a processing facility to concentrate the ore, and satellites deposits (118, Cristalino, Bacaba and Mata II projects).
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations. We are in the process of obtaining or renewing (1) waste and tailings storage facilities permits and (2) social licenses related to projects. For information about environmental licensing, see <i>Information on the Company—Regulatory matters—Brazilian Regulation of Mining Dams</i> .
Mine types and mineralization styles	Iron oxide-copper-gold (IOCG) deposit, with copper as main element of economic interest and mined using the open pit method.
Associated facilities and infrastructure	Processing Facilities: The run of mine is processed at Sossego processing facilities with four main components: crushing, grinding, flotation and concentrate dewatering. Other facilities: Waste and tailings disposal structures. Logistics: We truck the concentrate to a storage terminal in Parauapebas and then transport it via the EFC railroad to the Itaqui Port in São Luís, state of Maranhão. In Itaqui Port, we lease a storage terminal until 2023, with a proposal for an extension for more 20 years, currently under analysis by competent authorities. Energy: Supplied through the national electricity grid. Produced directly by us or acquired through power purchase agreements

SALOBO	
Ownership interest	100%
Location	Carajás, State of Pará, Brazil.
Operator	Salobo Metais S.A.
Mineral titles ¹	Mining concession with no expiration date. Acreage: 9,181 ha
Stage/ Operations	Production Stage since 2012. Integrated open pit mining and milling operations.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	Iron oxide-copper-gold (IOCG) deposit, with copper and gold as main elements of economic interest and mined using open pit method.
Associated facilities and infrastructure	<p><i>Processing Facilities:</i> The run of mine is processed by means of standard primary and secondary crushing, conveying, roller press grinding, ball milling, copper concentrate flotation, tailings disposal, concentrate thickening, filtration and load out.</p> <p><i>Other facilities:</i> Waste and tailings disposal structures.</p> <p><i>Logistics:</i> We truck the concentrate to a storage terminal in Parauapebas and then transport it via the EFC railroad to the Itaqui Port in São Luís, state of Maranhão. In Itaqui Port, we lease a storage terminal until 2023, with a proposal for an extension for more 20 years, currently under analysis by competent authorities.</p> <p><i>Energy:</i> Supplied through the national electricity grid. Acquired through power purchase agreements</p>

ALEMÃO PROJECT



Ownership interest	100%
Location	Carajás, State of Pará, Brazil.
Operator	Vale S.A.
Mineral titles	Mining concession with no expiration date Acreage: 10,000 ha.
Stage/ Operations	Exploration Stage – FEL3 technical study ongoing.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	Iron oxide-copper-gold deposit situated in the Carajás National Forest. The project is to develop a sublevel caving underground mine.
Associated facilities and infrastructure	<i>Processing Facilities:</i> The project is expected to have as processing facilities: primary crusher, ball milling, copper concentrate flotation, magnetic concentration, filtration and tailings disposal. <i>Energy:</i> Is expected to improve the current transmission line to 230kV capacity.

ASIA/PACIFIC

HU'U PROJECT



Ownership interest	80% ownership Vale
Location	Province of Nusa Tenggara Barat (NTB) Sumbawa island, Indonesia
Operator	Sumbawa Timur Mining - STM
Mineral titles	Contract of Work covering approximately 19,260 ha is valid with the Government of Indonesia, comprising all the stages of a Mining project. Each stage is renewable depending on the Government's approval. Acreage: 19,260 ha.
Stage/ Operations	Exploration stage. – FEL2 technical study ongoing.
Key permit conditions	We have or expect to obtain in a timely manner the necessary permits for operations.
Mine types and mineralization styles	The Onto copper-gold deposit is a large porphyry copper-gold deposit that also has some characteristics of high sulphidation epithermal deposits. The project is to develop an underground mine.
Associated facilities and infrastructure	<i>Logistics:</i> This project is a greenfield project, therefore the actual logistics of transporting ore as well processing are still under study. <i>Infrastructure:</i> The existing infrastructure is under development due to the project's greenfield location.

CANADA

See Base metals-- Nickel - Operations

2.2.2 Production

The following table sets forth our annual mine production in our Salobo and Sossego mines and the average percentage grades of copper. The production and average grade represent in-place ore production and do not include losses due to processing. For the annual production of copper as a coproduct in our nickel operations, see *Base metals—Nickel—Production*.

	2021(1)		2020(1)		2019(1)	
	Production	Grade	Production	Grade	Production	Grade
<i>Brazil</i>						
Sossego	16,164	0.74	13,145	0.85	11,735	0.79
Salobo	39,418	0.61	43,151	0.68	48,468	0.69
Total	55,582	0.77	56,296	0.72	60,203	0.71

(1) Production is stated in thousands of metric tons. Grade is % of copper.

The following table sets forth information on our copper production.

Mine	Type	<i>Finished production by ore source for the year ended December 31,</i>		
		2021	2020	2019
<i>(thousand metric tons)</i>				
<i>Brazil:</i>				
Sossego	Open pit	81.8	87.7	65.5
Salobo	Open pit	144.6	172.7	189.4
<i>Canada: (as coproduct of nickel operations)</i>				
Sudbury	Underground	46.2	76.5	92.8
Voisey's Bay	Open pit/Underground	20.2	17.8	25.0
Thompson	Underground	0.4	0.8	0.9
External(1)	–	3.6	4.5	7.5
Total		296.8	360.0	381.1

(1) We process copper at our facilities using feed purchased from unrelated parties.

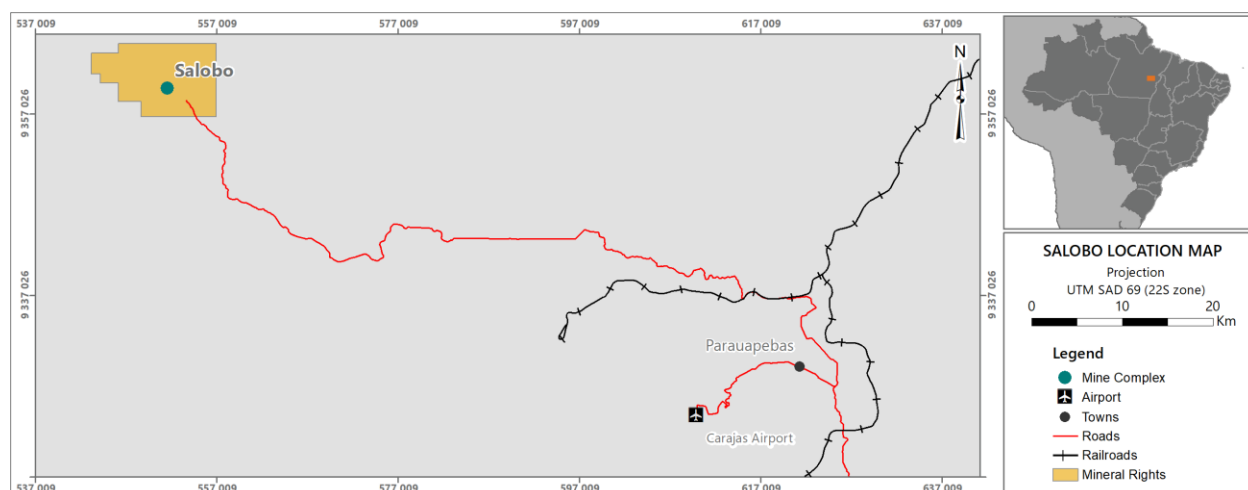
2.2.3 Individual property disclosure

We consider Salobo to be a material property, for purposes of S-K 1300.

2.2.3.1 Salobo

Property description

Salobo operations constitute a production stage property situated in the Carajás Mining District, Pará State, Brazil, 90 km northwest of the city of Parauapebas. Geographic coordinates for the Salobo Operations are 5°47'27" S latitude and 50°32'5" W longitude, using the Geographic_SAD 69 coordinate system. Salobo operations are owned by Salobo Metais S.A., our wholly owned subsidiary.



Infrastructure

Salobo operations are connected via an all-weather road network to the cities of Parauapebas (90 km) and Marabá (240 km). There is a commercial airport at Carajás. Railroads link Carajás with the port city of São Luis.

The required water permits are adequate and current.

Electrical energy is supplied from Tucuruí, an 8,370 MW hydroelectric-generating station on the Tocantins River, 200 km north of Marabá, and 250 km due north of Parauapebas. The 180 MW of power required by the Salobo Operations (including Line III) is transmitted by an 87 km-long overhead 230 kV transmission line.

The Carajás district has a long history of mining operations. Personnel with experience in mining activities are available throughout the district. The workforce resides in Carajás, Parauapebas, and surrounding settlements.

Salobo is in the Northwest of the Carajás region within Tapirapé–Aquiri national forest. In the mine area the topography is steep, varying between 190–520 m in elevation. The area is heavily forested and dominated by relative dense trees with substantial underbrush. The Carajás district is within the eastern Amazon humid tropical rainforest and has distinct wet and dry seasons. Mining operations are conducted year-round.

Geology and Mineralization

The Salobo deposit is an example of an iron oxide-copper-gold (IOCG) deposit and is hosted in the Carajás Mining District within Carajás Province, a sigmoidal-shaped, west–northwest–east–southeast-trending late Archean basin.

The mineralization consists of mineralogical assemblages of magnetite–chalcopyrite–bornite and magnetite–bornite–chalcocite in a number of styles as disseminations, stringers, stockworks, massive accumulations, fracture fillings, or veins.

The deposit extends over an area of approximately 4 km along strike (west–northwest), is 100–600 m wide, and has been recognized to depths of 750 m below the surface.

Exploration

Exploration has occurred on the property since 1974 and includes geological mapping, drilling, and airborne geophysical surveys, metallurgical testwork, environmental and baseline studies, mining studies, and permitting activities. We continually invest in mineral exploration with the aim of expanding our mineral resources and mineral reserves and achieving an adequate level of confidence in the resource estimate that supports our mining plans.

Mineral Rights

We have a mining concession for Salobo operations, license 807.426/74, granted for copper ore, gold and silver by the National Mining Agency (ANM) on July 16, 1987, covering 9,180.60 ha.

Surface rights

Salobo is located entirely within the Tapirapé–Aquiri National Forest, which belongs to the Federal Government. There are no third-party properties adjacent to the mining complex. There are no associated payments related to surface rights.

Current, planned, future mining plans

Mining is carried out as an open pit truck-shovel operation with a planned mine life of approximately 26 years, ending in 2045. The process plant will continue to operate by reclaiming stockpiled material until 2053.

With the Salobo 3 expansion, the base case mine production schedule involves the movement of 126 Mtpy to feed an expanded processing capacity of 36Mtpy, by processing a portion of the ore that would have been stockpiled in the previous 24 Mtpy production plan.

The process plant is designed to operate 365 days per year. The plant produces a copper concentrate that is transported by road to a rail offloading facility for rail transport to the seaport of São Luis.

The existing processing plants, Line 1 and Line 2 (Salobo I and II), each have a nominal 12 Mt capacity. We are currently implementing the Salobo III project to provide a third line that has a nominal 12 Mt circuit, to increase the process capacity to a total of 36 Mty.

Asset details and modernization

Salobo mine has been operating since 2012, with an open pit method, using shovels for ore and waste production, together with hydraulic shovels, wheel loaders, a fleet of off-road haul trucks and auxiliary equipment to maintain the access to production areas and slope drainage. A robust replacement program ensures that this equipment follows a manufacturer recommendation for life of asset and when the useful life of equipment is ending, we plan and invest in a fleet upgrade

Total property book value

The book value of the Salobo operations and its associated plant and equipment was US\$1,987 million, as of December 31, 2021, which does not include the shared infrastructure assets such as ports and railways.

Operator history

All exploration and development were conducted by us. Copper mineralization was discovered in the Igarapé Salobo region in 1974. Detailed exploration commenced in 1977. A scoping study was completed in 1981, and pilot studies ran from 1985 to 1987, culminating in the grant of a mining concession. A prefeasibility study was concluded in 1988, an initial feasibility study was conducted in 1998, updates to the feasibility study were undertaken in 2001 and 2002, and a final study was completed in 2004. The Salobo Operations commenced pre-stripping in 2009, and the first concentrate was produced in 2012. The process plant was upgraded in 2014 and is currently undergoing a second upgrade.

Encumbrances and permitting requirements

There are no material encumbrances for Salobo Operations.

Mineral resources

The lithological and mineralization models were produced using information on the deposit geological features, including structure, hydrothermal alteration minerals, lithologies and mineralization. The mineralization is constructed

based on two grade shells representing low grade and high-grade orebodies. The deposit was divided in sectors according to structural orientation.

Estimation domains were based on units defined for total copper and gold, resulting from a combination of sector and ore codes, and weathering variables (oxide, transition, sulphide). Soft boundaries were used between the weathering domains for low-grade and high-grade during the estimation of all variables. For the low-grade and high-grade contacts, hard boundaries were used for copper, gold, silver, sulphur, and density.

Copper and gold grades were capped during compositing and restrictions on the area of influence of an outlier assay were also imposed during estimation process.

Block grades and density were estimated using ordinary kriging (OK). Blocks were estimated during three successive passes.

Classification of blocks was assigned according to the pass in which the blocks were estimated. Blocks estimated during pass 1 were coded as measured, pass 2 as indicated and pass 3 as inferred. Subsequently, this automated classification was adjusted to recode any anomalous blocks situated in areas of common category

All disclosure of mineral resources is exclusive of mineral reserves.

Salobo - Summary of Copper Mineral Resources as of December 31, 2021 ^{(1) (2)}					
Category	2021 ⁽³⁾			Cut-off grade ⁽⁴⁾	Metallurgical Recovery ⁽⁴⁾
	Tonnage	Cu	Au		
Measured	30.2	0.39	0.17	0.25 %CuEq	Cu 80-90%. Au-60-70%
Indicated	439.4	0.49	0.25		
Measured + Indicated	469.7	0.48	0.24		
Inferred	268.9	0.5	0.3		

(1) The mineral resource prospects of economic extraction were determined using the following price assumptions per metric ton: for copper US\$7,000/metric ton and for gold US\$1,300/oz.

(2) Resources are reported on an 100% basis, as operations are entirely owned by us.

(3) Tonnage is in millions of dry metric tons and Cu grades are in (%), Au grades in g/t. The point of reference for the estimate is in situ metric tons.

(4) The metallurgical recovery is shown as a range, due to the variability in specific orebody requirements and timing of the associated estimate

Mineral reserves

For a discussion of the changes from the previous fiscal year, see "Reserves and Resources."

Salobo - Summary of Copper Mineral Reserves as of December 31, 2021 ^{(1) (2) (6)}								
Category	2021 ⁽³⁾			2020 ⁽³⁾			Cut-off grade ⁽⁴⁾	Metallurgical Recovery ⁽⁴⁾
	Tonnage	Cu	Au ⁽⁵⁾	Tonnage	Cu	Au ⁽⁵⁾		
Proven	231.0	0.69	0.40	142.2	0.67	0.37	0.25% CuEq	Cu 80-90%. Au-60-70%
Probable	902.4	0.60	0.34	1014.9	0.58	0.30		
Total	1,133.4	0.62	0.35	1157.1	0.59	0.31		

(1) The mineral reserve economic viability was determined based on the following long-term price assumptions: for copper US\$7,500/metric ton, for gold US\$1,450/oz.

(2) The resources are reported on an 100% basis, as operations are entirely owned by us.

(3) Tonnage is in millions of dry metric tons and Cu grades are in (%), Au grades are in g/t. Point of reference is the point of delivery to the process plant.

(4) The metallurgical recovery is shown as a range, due to the variability in specific orebody requirements and timing of the associated estimate.

(5) Figures shown do not deduct the streaming amounts. For a description of our streaming arrangement with Wheaton, see Section 2.3 PGM's and other Precious Metals.

(6) Estimated consolidated copper ore reserves include 206.1 million dry metric tons of stockpile.

2.2.4 Customers and sales

We sell copper concentrates from Sossego and Salobo under medium- and long-term contracts to copper smelters in Europe, India and Asia. We have medium-term copper supply agreements with domestic customer for part of the copper concentrates and copper matte produced in Sudbury, which are also sold under long-term contracts in Europe and

Asia. We sell copper concentrates from Voisey's Bay under medium and long-term contracts to customers in Europe and electro win copper cathodes from Sudbury and Long Harbour in North America under short-term sales agreements.

2.2.5 Competition

The global refined copper market is highly competitive. Producers are integrated mining companies and custom smelters, covering all regions of the world, while consumers are principally wire rod and copper-alloy producers. Competition occurs mainly on a regional level and is based primarily on production costs, quality, reliability of supply and logistics costs. The world's largest copper cathode producers are Jiangxi Copper Corporation Ltd., Corporación Nacional del Cobre de Chile ("Codelco"), Tongling Non-Ferrous Metals Group Co., Freeport McMoRan Copper & Gold Inc., Aurubis AG and Glencore, each operating at the parent-company level or through subsidiaries. Our participation in the global refined copper cathodes market is marginal as we position ourselves more competitively in the copper concentrate market.

Copper concentrate and copper matte are intermediate products in the copper production chain. Both the concentrate and matte markets are competitive, having numerous producers but fewer participants and smaller volumes than in the copper cathode market due to the high levels of integration by the major copper producers.

In the copper concentrate market, mining occurs on a global basis with a predominant share from South America, while consumers are custom smelters located mainly in Europe and Asia. Competition in the custom copper concentrate market occurs mainly on a global level and is based on production costs, quality, logistics costs and reliability of supply. The largest competitors in the copper concentrate market are Freeport McMoRan, Glencore, BHP Billiton, Codelco, Anglo American, Antofagasta plc, Rio Tinto and First Quantum; each operating at the parent-company level or through subsidiaries. Our market share in 2021 was about 1.2% of the total copper concentrate market.

2.3 PGMs and other precious metals

As byproducts of our Sudbury nickel operations in Canada, we recover significant quantities of PGMs, as well as small quantities of gold and silver. We operate a processing facility in Port Colborne, Ontario, which produces PGMs, gold and silver intermediate products using feed from our Sudbury operation. PGM concentrates, gold and silver intermediates from our Port Colborne operation are being sold to third parties. Our copper concentrates from our Salobo and Sossego mines in Carajás, in the Brazilian state of Pará, also contain gold, the value of which we realize in the sale of those products.

We have sold to Wheaton Precious Metals Corp. ("Wheaton") an aggregate of (i) 75% of the gold produced as a byproduct at our Salobo copper mine, in Brazil, for the life of mine, and (ii) 70% of the gold produced as a byproduct at our Sudbury nickel mines, in Canada, for 20 years. These sales were made in three different streaming transactions, in February 2013, March 2015 and August 2016. In connection with these streaming transactions:

- We received upfront payments of (i) US\$1.9 billion in 2013, (ii) US\$900 million in 2015 and (iii) US\$800 million in 2016. We also received 10 million warrants exercisable into Wheaton shares, which we sold in February 2020 for US\$2.5 per warrant, totaling US\$25 million.
- We receive ongoing payments of the lesser of US\$400 per ounce (subject to a 1% annual inflation adjustment under the Salobo contract starting January 1, 2019) and the prevailing market price, for each ounce of gold that we deliver under the agreement.
- We may receive an additional cash payment if we expand our capacity to process Salobo copper ores to more than 28 Mtpy before 2036. The additional cash payment may range from US\$113 million to US\$953 million, depending on ore grade, timing and size of the expansion.

The following table sets forth information on the contained volume of precious metals and platinum group metals (PGMs) as a byproduct of our production of nickel and copper concentrates.

Mine	Type	Finished production by ore source for the year ended December 31,		
		2021	2020	2019
<i>(thousand troy ounces of contained metal)</i>				
<i>Sudbury(1):</i>				
Platinum	Underground	78	140	148
Palladium	Underground	98	186	182
Gold(2)	Underground	27	70	69
<i>Salobo:</i>				
Gold(2)	Open pit	274	331	368
<i>Sossego:</i>				
Gold	Open pit	63	68	43

(1) Includes metal produced from unrelated parties feed purchases. Includes production out of Ontario (Canada) and Acton (England) production. Acton production refers only to 2019 and 2020. Excludes tolling from unrelated parties.

(2) Figures represent 100% of Salobo and Sudbury contained volume of gold as a byproduct of our production of nickel and copper concentrates and do not deduct the portion of the gold sold to Wheaton.

2.4 Cobalt

We recover significant quantities of cobalt as a byproduct of our nickel operations. In 2021, we produced 751 metric tons of refined cobalt metal (in the form of cobalt rounds) at our Port Colborne refinery, 1,768 metric tons of cobalt rounds at our Long Harbour refinery. We sell cobalt on a global basis. The cobalt metal and the Long-Harbour cobalt rounds are electro-refined at our Port Colborne refinery and have very high purity levels (99.8%), meeting the LME contract specification. Cobalt metal is used in the production of various alloys, particularly for aerospace applications, and in the manufacturing of cobalt-based chemicals primarily for use in rechargeable batteries.

In June 2018, we sold to Wheaton and Cobalt 27 Capital Corp. ("Cobalt 27") a combined 75% of the cobalt produced as a byproduct at our Voisey's Bay mine from January 1, 2021, which includes the ramp-down of production from the existing mine and the life-of-mine production from our underground mine expansion project. In consideration, we received US\$690 million in cash from Wheaton and Cobalt 27 upon closing of the transaction on June 28, 2018, and will receive additional payments of 18-22% of cobalt prices upon delivery. In February 2021, the stream originally sold to Cobalt 27 was assigned to Anglo Pacific Group. We remain exposed to approximately 40% of future cobalt production from Voisey's Bay, through our retained interest in 25% of cobalt production and the additional payments upon delivery.

The following table sets forth information on our cobalt production.

Mine	Type	Finished production by ore source for the year ended December 31,		
		2021	2020	2019
<i>(contained metric tons)</i>				
Sudbury	Underground	304	453	495
Thompson	Underground	35	60	80
Voisey's Bay(1)	Open pit	1,770	1,591	1,608
Others(2)	–	414	369	490
Total		2,523	2,474	2,673

(1) Figures represent 100% of cobalt production, and do not deduct the portion of cobalt stream sold to Cobalt27, Wheaton and Anglo Pacific Group.

(2) These figures do not include tolling of feeds for unrelated parties. Includes cobalt processed at our facilities using feeds purchased from unrelated parties and PTVI ore source 313 metric tons in 2019, 233 metric tons in 2020, and 324 metric tons in 2021.

2.5 Logistics and energy assets to support Base Metals operations

Ports

Canada

Vale Newfoundland&Labrador Limited operates a port as part of our mining operation at Voisey's Bay, Labrador and a port as part of our processing operation at Long Harbour, Newfoundland. The port at Voisey's Bay is used for shipping nickel and copper concentrates and re-supply. The port at Long Harbour is used to receive nickel concentrate from Voisey's Bay along with goods and materials required for the Long Harbour operation.

Indonesia

PTVI owns and operates two ports in Indonesia to support its nickel mining activities.

- The Balintang Special Port is located in Balintang Village, South Sulawesi, and has two types of piers, two barge slips for barges with capacity of up to 5,000 DWT each for dry bulk cargo, and a general cargo wharf for vessels of up to 2,000 DWT.
- The Tanjung Mangkasa Special Port is located in Lampia Village, South Sulawesi, with mooring buoys that can accommodate fuel tankers with capacity of up to 20,000 DWT, and a jetty terminal that can accommodate fuel tanker vessels with capacity of up to 5,000 DWT.

Energy

Canada

In 2021, our wholly owned and operated hydroelectric power plants in Sudbury generated 13% of the electricity requirements of our Sudbury operations. The power plants consist of five separate generation stations with an installed generator nameplate capacity of 55 MW. The output of the plants is limited by water availability, as well as by constraints imposed by a water management plan regulated by the provincial government of Ontario. Over the course of 2021, average demand for electrical energy was 145 MW to all surface plants and mines in the Sudbury area.

In 2021, diesel generation provided 100% of the electric requirements of our Voisey's Bay operations. We have six diesel generators on-site, with output ranging from 12 to 14 MW, in order to meet seasonal demands.

Indonesia

Energy costs are a significant component of our nickel production costs for the processing of lateritic ore at our PTVI operations in Indonesia. A major portion of PTVI's electric furnace power requirements is supplied at a low cost by its three hydroelectric power plants on the Larona River: (i) the Larona plant, which has an average generating capacity of 165 MW, (ii) the Balambano plant, which has an average capacity of 110 MW and (iii) the Karebbe plant, with 90 MW of average generating capacity. These plants help reduce production costs by substituting oil used for power generation with hydroelectric power, reduce CO₂ emissions by replacing non-renewable power generation, and enable us to increase our current nickel production capacity in Indonesia.

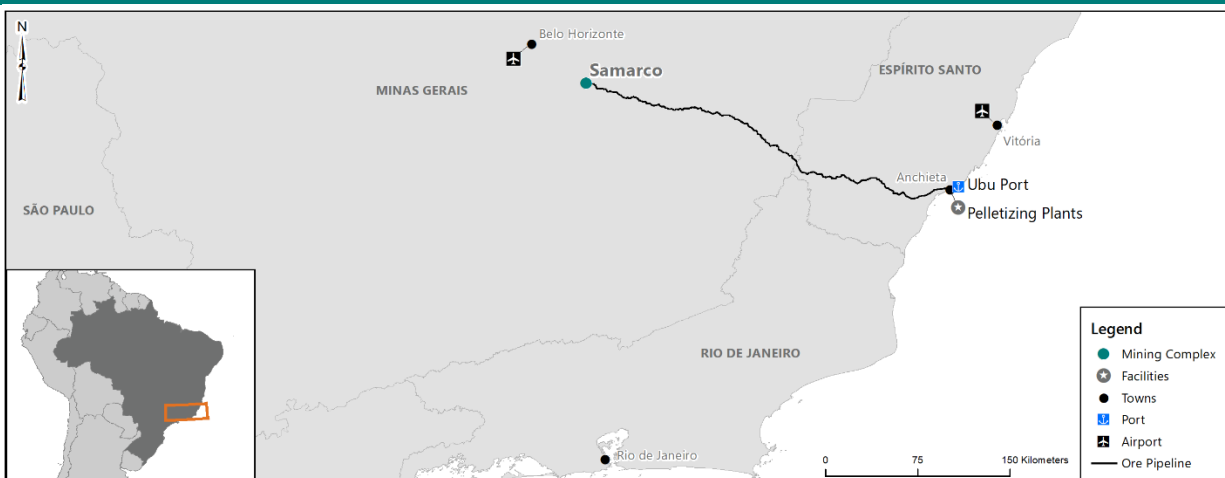
3. OTHERS

3.1 Samarco

Samarco. We own a 50% stake in Samarco, and BHPB owns the remaining 50% equity interests. Samarco owns an integrated system comprised of two different pits, three beneficiation plants, three pipelines, four pellet plants and a port. The mines and the beneficiation plants are located in the state of Minas Gerais and the pellet plants and port are located in the state of Espírito Santo. From Minas Gerais to Espírito Santo state production flows through the three pipelines which extend for approximately 400 Km. Samarco's mining and pelletizing operations have been gradually resuming since December 2020.

For additional information about the rupture of Fundão tailings dam in 2015, see “Business Overview—Responses to the Rupture of Samarco’s Tailings Dam in Minas Gerais.” Samarco has approximately R\$50 billion in debt subject to a judicial reorganization proceeding in Brazil, of which approximately R\$24 billion are owed to its shareholders, BHPB and us. Debt claims of BHPB and us are mostly related to funds provided to Samarco after the rupture of the Fundão dam, for the purpose of maintenance and operating expenses, as well as in connection with socio-economic and socio-environmental remediation and compensation measures, contributions to Fundação Renova and the reestablishment and resumption of Samarco’s operations. In June 2021, Samarco filed its first reorganization plan. In February, March and April 2022, new plans were filed. The general creditor meeting was installed in March 2022, and is currently suspended in agreement with creditors.

SAMARCO



Ownership interest	50% owned by Vale; 50% by BHPB
Location	Mariana and Ouro Preto, State of Minas Gerais, Brazil
Operator	Samarco Mineração S/A
Mining complexes	Integrated system comprised of two different pits, three beneficiation plants, three pipelines, four pump stations, two valves station, four pellet plants and a port.
Mining title ⁽¹⁾	Mining concession with no expiration date. Acreage: 1,174.30 ha.
Stage/ Operations	Continued operations from 1977 to 2015. Operations were suspended in November 2015, following the break of Fundão dam. Gradually resuming operations since December 2020.
Key permit conditions	We understand that Samaco has the necessary permits for its current operations.
Mine types and mineralization styles	Itabirite ore types extracted using an open-pit mining method.

Associated facilities and infrastructure	<p><i>Mine:</i> Long distance conveyor belt systems transport the ore blending to beneficiation plants</p> <p><i>Processing plant:</i> The three beneficiation plants, located at the site, process the run of mine by means of standard crushing, milling, concentration steps, producing pellet feed.</p> <p><i>Logistics:</i> Samarco mines supply Samarco pellet plants using three pipelines extending approximately 400 kilometers, with four pump stations and two valve stations. These pipelines transport the iron ore from beneficiation plants to the pelletizing plants, and from the pelletizing plants to the port in the state of Espírito Santo.</p> <p><i>Port:</i> The production is embarked in an own port in the state of Espírito Santo.</p> <p><i>Energy:</i> Supplied through the national electricity grid. Acquired from regional utility companies or produced directly by Samarco.</p>
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⁽¹⁾ The mining titles area illustrated are limited to those where we have reserves and resources associated.

3.2 Other Investments

Below is a list of our main other investments:

Nickel refinery. We have a 25% indirect stake in Korea Nickel Corporation, which operates a nickel refinery in South Korea. The remaining stake is held by Korea Zinc Co., Ltd, Posteel Co., Ltd., Young Poong Co., Ltd., and others. Korea Nickel Corporation produces finished nickel for the stainless steel industry using intermediate products from our Matsusaka operations. Korea Nickel Corporation also used to produce finished nickel using intermediate products from VNC but that ceased in 2020 in connection with the sale of our investment held in VNC.

Steel producers. We own a 50% stake in Companhia Siderúrgica do Pecém ("CSP"), an integrated steel slab plant in the Brazilian state of Ceará in partnership with Dongkuk Steel Mill Co. and Posco, two major steel producers in South Korea. CSP's annual production capacity is 3.0 million metric tons. We recently sold our 50% stake in California Steel Industries, Inc. ("CSI"), a producer of flat-rolled steel and pipe products located in California, United States, to Nucor Corporation ("Nucor"). The remainder is owned by JFE Steel.

Bauxite. We own a 40% stake in Mineração Rio do Norte, a bauxite mining business located in Brazil.

VLI. VLI provides integrated logistics solutions through 7,940 kilometers of railroads in Brazil (FCA and FNS), eight inland terminals with a total storage capacity of 795,000 metric tons and three maritime terminals and ports operations. We hold a 29.6% stake in VLI, and are currently party to a shareholders' agreement with FI-FGTS, Mitsui, Brookfield and BNDESPar, which hold the remaining equity interests in VLI. In 2021, VLI transported a total of 41.0 billion ntk of general cargo, including 23.1 billion ntk from FCA and FNS and 17.9 billion ntk through operational agreements with Vale. VLI's main assets are:

- **Ferrovias Centro-Atlântica S.A. ("FCA").** Central-east regional railway network of the Brazilian national railway system, held under a 30-year renewable concession, which expires in 2026. The central east network has 7,220 kilometers of track, extending into the states of Sergipe, Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, Goiás and the Federal District of Brazil;
- **Ferrovias Norte-Sul S.A. ("FNS").** A 30-year renewable subconcession for the commercial operation of a 720-kilometer stretch of the North-South railroad in Brazil, between the cities Açailândia, in the Brazilian state of Maranhão, and Porto Nacional, in the Brazilian state of Tocantins. This railway is connected to EFC railroad, and creates a new corridor for the transportation of general cargo, mainly for the export of soybeans, rice and corn produced in the center-northern region of Brazil;
- Right to purchase capacity of our EFVM and EFC railroads for general cargo; and
- Right to purchase capacity of our Tubarão and Praia Mole terminals for general cargo.

MRS Logística S.A. (“MRS”). The MRS railroad, in which we hold a 48.16% direct and indirect equity interest, is 1,643 kilometers long and links the Brazilian states of Rio de Janeiro, São Paulo and Minas Gerais. The MRS railroad transports our iron ore products from the Southern System mines to our maritime terminals. In 2021, it transported a daily average of 286.2 thousand metric tons of iron ore and 179.4 thousand metric tons of other cargo.

RESERVES AND RESOURCES

INTERNAL CONTROLS

We have historically estimated mineral resources and mineral reserves utilizing the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) based codes. Starting in the fiscal year ended December 31, 2021, we are reporting in accordance with S-K 1300.

We have an established risk management process that is integrated with our Executive Risk Committee – see “*Risk Management*.” As part of our risk management process, we identify risks affecting uncertainty of mineral reserves and mineral resources disclosure, with standardized risk ratings and proposed mitigation activities.

We have a Mineral Resources and Mineral Reserves Global Committee, coordinated by our Exploration and Mineral Projects global department, with the purpose of promoting transparency, consistency, professional competence, and the reliability of all information prepared for internal purposes and public reporting. This committee is also responsible for overseeing the governance of our estimation and reporting of mineral reserves and resources.

Our internal guidelines define the responsibility for the governance and reporting of mineral resource and reserves, clarify concepts and bring technical guidance from the broader view to all business units. These internal guidelines are periodically reviewed and revised to ensure alignment with industry practice.

Our internal controls protocols for exploration data, as they relate to mineral resource and reserve estimation, contain:

- Written procedures and guidelines to support exploration work and approaches.
- Quality control checks on collar and downhole survey data to identify errors or significant deviations.
- Geological logs are checked and verified in a peer review, and a physical sign-off attests to the validation protocol.
- Maintenance of a chain-of-custody, ensuring the traceability and integrity of the samples at all handling stages from collection, transportation, sample preparation and analysis to long-term pulp and coarse reject storage.
- Regular inspection of analytical and sample preparation facilities by appropriately experienced Vale personnel.
- Appropriate types of quality control samples (standards, duplicates, and blanks) are inserted into the sample stream at appropriate frequencies to assess analytical data quality and representativity.
- Data is regularly verified to ensure that outlier sample mix-ups, contamination, or laboratory biases during the sample preparation and analysis steps are correctly identified, mitigated or remediated. An appropriate number of samples are analyzed at a different laboratory.
- Bulk density determinations are regularly checked by alternate methods.
- Quality Control and Quality Assurance (QA/QC) data validation and verification procedures are in place to support database upload which ensure the accuracy and integrity of the data being entered into the Project database(s). These are typically performed using software data-checking routines. Changes to database entries are required to be documented. Data files are subject to regular backups.
- The geological model, interpretation (includes reconciliation insights) and 3D modelling of the mineralized zones are subject to a peer review process aiming to identify any flaws or alternative interpretations that might not have been considered by the main modeler.

We have the following internal control protocols in place to guide mineral resource and mineral reserve estimation:

- Prior to use in mineral resource or mineral reserve estimation, the data being used to support estimation are downloaded from the database into a project file and reviewed for improbable entries and outlier values.
- Written procedures and guidelines are used to guide estimation methods and approaches.
- Peer reviews are undertaken on mineral reserve and resource estimations to ensure consistency with industry practices including reviews of geological model, block models, and mineral resource and reserve estimates
- Annual mineral reserve and resource technical statements estimates are prepared following Vale’s layered responsibility system see Vale’s Risk Management Section

- External mineral resource and mineral reserve audits are undertaken for applicable cases in accordance with our guidelines.

We follow a progressive staged Front-End-Loading (FEL) methodology project management and study process. The procedures, protocols, guidance, and controls are aligned to each study stage (FEL1, FEL 2, FEL 3), in support of mineral resource and mineral reserve estimation, mine designs and proposed operations.

This staged approach provides at least three stages of project review and allows for assessment and risk evaluations, including the ones related to mineral resource and mineral reserve estimates, economic assumptions and the engineering requirements for mining and extraction.

We conduct reviews of and updates to property risk registers as part of the mineral resource and mineral reserve estimation processes. Areas of uncertainty that may materially impact mineral resource and reserve estimates and are monitored for material changes for impact to estimations may include but are not limited to:

- Changes to long-term metal price, market and exchange rate assumptions.
- Changes in local interpretation of lithological, structural and mineralization geometry and continuity.
- Changes to estimation input parameters and estimation techniques in the resource modeling process.
- Changes to metallurgical recovery assumptions affecting concentrate grade, variability and quality.
- Changes in processing that result in higher deleterious elements that result in penalties or result in unsalable concentrate.
- Changes to the input assumptions used to derive the potentially mineable shapes applicable to the assumed underground and open pit mining methods used to constrain the estimates.
- Changes to mining selectivity and production rate assumptions.
- Changes to the forecast dilution and mining recovery assumptions.
- Changes to the cut-off values applied to the estimates.
- Variations in geotechnical (including seismicity), structures, rock mass strength, stress regime), hydrogeological, hydrothermal, geothermal factors, and mining method assumptions.
- Changes to environmental, permitting and social license assumptions.
- Long-term consumables price assumptions.

Other factors that can affect the reserve estimates include changes to:

- Mineral resource input parameters.
- Constraining underground or pit designs.
- Cut-off grade, Grade descriptor assumptions.
- Geotechnical (including seismicity), geothermal/hydrothermal and hydrogeological factors.
- Mining recovery assumptions based on similar types of mining methods; Metallurgical recovery are determined through testing of a significant number of drill core samples.
- Ability to control unplanned dilution.
- Ability to access the site, retain mineral, surface rights and water rights titles.
- Ability to maintain environmental and other regulatory permits and maintain the social license to operate.

PRESENTATION OF INFORMATION CONCERNING MINERAL RESERVES

The estimates of proven and probable mineral reserves at our mines and projects and the estimates of mine life included in this annual report have been prepared by our staff of experienced geologists and engineers, unless otherwise stated, and in accordance with the technical definitions established by the SEC under S-K 1300.

We periodically revise our reserve estimates when we have new geological data, economic assumptions or mining plans. During 2021, we performed an analysis of our reserve estimates for certain projects and operations, which is presented in this report. Reserve estimates for each operation assume that we either have or expect to obtain all the necessary rights and permits to mine, extract and process mineral reserves at each mine. For some of our operations, the projected exhaustion date includes stockpile reclamation. Where we own less than 100% of the operation, reserve estimates have been adjusted to reflect our proportional ownership interest. Certain numbers in the tables, discussions and notes have been rounded. For a description of risks relating to reserves and resources and reserve and resource estimates, see *Overview—Risk factors*.

The projected exhaustion date of our mines or complexes are continuously reviewed based on several factors and studies, including geological exploration, socio-environmental factors, mineral processing, economic assumptions, market demand, mining constraints, tailings or waste disposal constraints and production capacity, in each case supported by proven and probable mineral reserves. Investments in mineral exploration and the review of technical studies are part of our long-term strategy and continuous pursuit to add value to the company, by bringing operational reliability and expanding mineral reserves portfolio.

Our reserves have been estimated based on the commodity price assumptions as of December 31, 2021, the time of the economic analysis.

PRESENTATION OF INFORMATION CONCERNING MINERAL RESOURCES

Estimation was performed by our staff of experienced geologists and engineers, unless otherwise stated. All mineralogical information, exploration drilling and background information were provided to the estimators by the geological staff at the mines or by exploration staff.

The mineral resource confidence categories were initially assigned based on a combination of factors, including geological understanding and confidence, drill hole support, grade estimation confidence relative to planned production rates, and identified risk factors. The initial assignments were reviewed to assess the impacts of factors such as metallurgical recoveries, geomechanical studies, mine design work, and representative mineability and recovery reconciliation analysis. Where mining has occurred or is currently active, the mined-out volumes were overprinted upon the mineral resource model to account for mining depletion.

For each mineral resource estimate, at least an initial assessment was undertaken that assessed likely infrastructure, mining, and process plant requirements; mining methods; process recoveries and throughputs; environmental, permitting, and social considerations relating to the proposed mining and processing methods, and proposed waste disposal, and technical and economic considerations in support of an assessment of reasonable prospects of economic extraction. The assumptions made in the estimation our mineral resources may differ from those made in the estimation of our mineral reserves, because (i) the extraction of mineral resources occurs over a longer period of time, compared to the extraction of reserves, and (ii) different timing for mineral resource estimation and the economic analysis for purposes of reserve estimation or review. As of December 31, 2021, all the assumptions, including commodity price and resource mine designs, considered for our resource estimation continue to provide a reasonable basis for establishing the prospects of economic extraction of mineral resources.

We periodically revise our mineral resource estimates when we have new geological data, economic assumptions or mining plans. During 2021, we performed an analysis of our resource for certain projects and operations, which is presented in this report. Mineral resource estimates for each operation assume that we either have or expect to obtain all the necessary rights and permits to mine, extract and process mineral resources at each mine. Where we own less than 100% of the operation, resource estimates have been adjusted to reflect our proportional ownership interest. All mineral resources presented are exclusive of mineral reserves. Certain numbers in the tables, discussions and notes have been rounded. For a description of risks relating to resource and reserve estimates, see *Overview—Risk factors*. Our mineral resource estimates are based on certain assumptions about prices as shown in the table below.

IRON ORE MINERAL RESERVES AND MINERAL RESOURCES

We classify our iron ore mineral reserves as proven to the extent that they satisfy the requirements of the definition of proven reserves under S-K 1300 and that we have obtained the environmental licenses for the corresponding pit operation or have at least a reasonable expectation of obtaining on a timely basis any additional licenses necessary to conduct the operations.

We periodically review the economic viability of our iron ore mineral reserves considering changes in the iron ore industry.

Iron Ore Mineral reserves at December 31, 2021 ^{(1) (2)}								
Tonnage in metric million tons inclusive moisture and dry %Fe grade								
	Proven – 2021		Probable – 2021		Total – 2021		Total – 2020	
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade
<i>Southeastern System (3)</i>								
Itabira (4)	327.1	48.2	595.8	44.2	922.9	45.6	1,002.3	45.8
Minas Centrais (5)	435.9	42.6	919.9	50.7	1,355.8	48.1	1,532.4	47.2
Mariana (6)	110.0	54.6	359.4	57.5	469.4	56.8	1,810.1	46.7
Southeastern System - total	873.0	46.2	1,875.1	50.0	2,748.1	48.8	4,344.8	46.7
<i>Southern System (7)</i>								
Vargem Grande (8)	590.3	47.9	2,709.7	45.7	3,300.0	46.1	3,335.2	46.2
Paraopeba (9)	105.5	56.9	224.9	57.8	330.4	57.5	335.9	57.5
Southern System - total	695.8	49.2	2,934.7	46.6	3,630.5	47.1	3,671.0	47.2
<i>Northern System (10)</i>								
Serra Norte (11)	464.3	66.1	1,125.9	65.7	1,590.2	65.8	1,717.2	65.8
Serra Sul (12)	1,825.8	66.0	2,447.2	65.6	4,273.0	65.8	4,430.1	65.7
Serra Leste	-	-	253.6	64.7	253.6	64.7	259.8	64.8
Northern System - total	2,290.1	66.1	3,826.7	65.6	6,116.8	65.8	6,407.2	65.7
Total	3,858.9	58.5	8,636.5	55.7	12,495.4	56.6	14,423.0	55.3

- (1) Iron Ore Reserve estimates stated as metric million tons inclusive moisture and dry %Fe grade; following moisture contents: 1.15% Itabira; 5.59% Minas Centrais; 7.61% Mariana; 6.26% Vargem Grande; 7.32% Paraopeba; 6.41% Serra Norte; 7.22% Serra Sul; 6.47% Serra Leste. Our Iron Ore mineral reserve estimates are of in-situ material, except for 47.4 Mt tons of stockpile included in the Mariana Complex.
- (2) The mineral reserve economic viability was determined based price curve with the long-term price being US\$70/dmt for 62% iron grade.
- (3) Average product recovery (tonnage basis) of the iron ore reserves are: 50% for Itabira, 67% for Minas Centrais and 74% for Mariana.
- (4) The Itabira integrated operation includes Conceição and Minas do Meio mines.
- (5) Minas Centrais complex comprises the reserves for Brucutu, Apolo project and Morro Agudo mine. The mineral reserve for the Minas Centrais complex has been adjusted to reflect our 98.7% ownership interest.
- (6) Mariana complex includes Alegria, Fábrica Nova and Fazendão mines and Capanema project.
- (7) Average product recovery (tonnage basis) of the iron ore reserves are: 68% for Vargem Grande and 74% for Paraopeba.
- (8) Vargem Grande complex includes Sapeçado, Galinheiro, Tamanduá, Capitão do Mato and Abóboras mines.
- (9) Paraopeba complex includes João Pereira and Segredo, Mar Azul and Capão Xavier mines.
- (10) Average product recovery (tonnage basis) of the iron ore reserves are: 100% for Serra Norte, 100% for Serra Leste and 100% for Serra Sul.
- (11) Serra Norte complex includes N3, N4W, N4E and N5 mines and N1 and N2 projects.
- (12) Serra Sul complex includes S11D and S11C deposits.

We periodically revise our mineral resource and mineral reserve estimates based on new geological data, study developments, economic assumptions, mining plans, new technology developments and regulatory updates, among other factors. Future changes in these aspects may positively or negatively impact our future mineral reserves. Variations in iron ore reserves from 2020 to 2021 reflect mainly depletion resulting from mine production for operating mines (corresponding to approximately 414Mt), downgrades resulting from strategic review of long-term projects and others modified factors assumptions (geotechnical, market and processing).

The main changes are summarized below:

- In the Southeastern System, our reserves decreased 36.7%, to 2.7Bt in 2021 from 4.3Bt of mineral reserves in 2020. This mainly reflects a review of a long-term project to process low grade itabirites from Mariana operations to consider new technical solutions aligned with our strategical plan, including ceasing the transfer of ROM (run of mine) from Mariana to Itabira beneficiation plants. As a result of this project review, approximately 1.3Bt of previously reported mineral reserves of the Mariana complex have been reclassified as mineral resources. The mineral reserves of Minas Centrais complex decreased by 140Mt as a result of pit optimization reviews, corresponding to approximately 10% of mineral reserves.
- In the Northern System, the mineral reserves of S11D (Serra Sul Complex) decreased by 157Mt due to the incorporation of new geological information and depletion, corresponding to 3.5% of Serra Sul mineral reserves. The mineral reserves of Serra Norte decreased by 127Mt due to depletion, corresponding to 7.4% of mineral reserves due to depletion.

- In the Southern System, the mineral reserves of the Vargem Grande complex decreased by 35Mt due to depletion, corresponding to 1.0% of mineral reserves.

As a result of mine scheduling and production plan reviews, the estimated exhaustion of Itabira Complex was extended up to 2041.

Iron Ore Mineral Resources as of December 31, 2021 ^{(1) (2)}								
Tonnage in metric million tons inclusive moisture and dry %Fe grade								
	Measured		Indicated		Measured and Indicated		Inferred	
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade
<i>Southeastern System</i>								
Itabira (3)	170.9	52.6	303.2	45.5	474.1	48.0	257.7	41.9
Minas Centrais (4)	193.1	46.4	572.2	44.4	765.3	44.9	873.5	43.0
Mariana (5)	2,554.8	41.7	2,046.5	40.2	4,601.4	41.0	2,274.7	39.1
Southeastern System - total	2,918.8	42.6	2,921.9	41.6	5,840.8	42.1	3,405.9	40.3
<i>Southern System</i>								
Vargem Grande (6)	1,346.6	40.8	1,871.5	39.1	3,218.1	39.8	2,147.6	37.6
Paraopeba (7)	1,109.3	45.5	1,452.2	40.9	2,561.5	42.8	1,968.0	38.5
Southern System - total	2,455.9	42.9	3,323.7	39.9	5,779.6	41.2	4,115.6	38.0
<i>Northern System</i>								
Serra Norte (8)	592.7	66.4	491.5	66.1	1,084.2	66.3	293.4	66.0
Serra Sul (S11) (9)	479.9	66.0	388.0	64.6	867.8	65.4	123.5	64.3
Serra Leste (SL1)	295.1	50.9	197.2	48.3	492.3	49.9	56.7	49.5
Northern System - total	1,367.6	62.9	1,076.7	62.3	2,444.3	62.6	473.6	63.6
<i>Midwestern System</i>								
Midwestern (10)	129.3	63.1	252.2	62.8	381.5	62.9	248.2	62.9
Midwestern System - total	129.3	63.1	252.2	62.8	381.5	62.9	248.2	62.9
Total	6,871.6	47.2	7,574.6	44.5	14,446.2	45.8	8,243.3	41.2

(1) Mineral resources are reported exclusive of those mineral resources converted to mineral reserves. Iron Ore mineral resources estimates stated as metric million tons inclusive moisture and dry %Fe grade; following moisture contents: 1.52% Itabira; 6.22% Minas Centrais; 3.55% Mariana; 2.64% Vargem Grande; 4.43% Paraopeba; 6.51% Serra Norte; 7.10% Serra Sul; 4.50% Serra Leste and 7.29% Midwestern. Our Iron Ore mineral resources estimates are of in-situ material.

(2) The mineral resources prospects of economic extraction were determined based on a long-term price of US\$78/dmt for 62% iron grade.

(3) The Itabira integrated operation includes Conceição and Minas do Meio mines.

(4) Minas Centrais integrated operation includes Brucutu and Morro Agudo mines and the Apolo project. Figure have been adjusted to reflect our 98.7% ownership interest in the Minas Centrais complex.

(5) Mariana integrated operation includes Alegria, Fábrica Nova and Fazendão mines and Capanema project.

(6) Vargem Grande integrated operation includes Sapecado, Galinheiro, Tamanduá, Capitão do Mato and Abóboras mines.

(7) Paraopeba integrated operation includes João Pereira and Segredo, Mar Azul and Capão Xavier mines.

(8) Serra Norte integrated operation includes N3, N4W, N4E and N5 mines and N1, N2 projects.

(9) Serra Sul integrated operation includes S11D and S11C deposits.

(10) Midwestern integrated operation includes Urucum and Corumbá (MCR) deposits. In April 2022, we entered into a binding agreement with J&F Mineração Ltda. for the sale of all of our assets in the Midwestern System. See *Overview—Business overview—Significant Changes in Our Business—Divestments*.

The mine exhaustion schedule has been adjusted due to our new production plan and our revision of project capacity.

Type	Iron Ore integrated operations			Vale interest (%)	
	Operating since	Projected exhaustion date – 2021(1)	Projected exhaustion date – 2020(2)		
<i>Southeastern System</i>					
Itabira	Open pit	1957	2041	2031	100.0

Minas Centrais	Open pit	1994	2061	2058	98.7
Mariana	Open pit	1976	2038	2054	100.0
<i>Southern System</i>					
Vargem Grande	Open pit	1942	2089	2093	100.0
Paraopeba	Open pit	2003	2042	2043	100.0
<i>Northern System</i>					
Serra Norte	Open pit	1984	2038	2037	100.0
Serra Sul	Open pit	2016	2062	2058	100.0
Serra Leste	Open pit	2014	2054	2048	100.0

(1) Indicates the life-of-mine for the operating mine with the longest projected exhaustion date in the complex, as of December 31, 2021.

(2) Projected exhaustion dates estimated as of December 31, 2020. Projected exhaustion dates in this column are superseded by the estimates indicated under "Projected exhaustion date – 2021."

NICKEL MINERAL RESERVES AND MINERAL RESOURCES

Our nickel mineral reserve estimates are of in-situ material after adjustments for depletion, mining dilution and mining losses (or screening and drying in the case of PTVI), with no adjustments made for metal losses due to processing recoveries.

	Nickel Mineral Reserves as of December 31, 2021 ⁽¹⁾⁽²⁾									
	Tonnage in millions of dry metric tons. Grades in %									
	Proven – 2021		Probable – 2021		Total – 2021		Total – 2020		Recovery Range(5) (%)	
Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade			
<i>Canada</i>										
Sudbury	18.9	1.51	35.0	1.24	53.8	1.33	51.1	1.39	75-85	
Thompson	-	-	-	-	-	-	-	-	-	
Voisey's Bay	11.6	2.02	15.3	1.89	26.8	1.95	28.6	1.96	75-85	
<i>Indonesia</i>										
PTVI (2)	29.1	1.72	20.8	1.73	49.9	1.72	46.1	1.74	85-90	
<i>Brazil</i>										
Onça Puma (3)	53.9	1.60	57.1	1.28	111.0	1.44	104.7	1.51	85-90	
Total	113.5	1.66	128.2	1.41	241.5	1.53	230.5	1.59		

(1) Tonnage is in millions of dry metric tons. Ni grades are in (%). The point of reference for the mineral reserve estimate is the point of delivery to the process plant.

(2) The mineral reserve economic viability was determined based on long-term price of Ni US\$18,000/t for Nickel.

(3) PTVI mineral reserves are only from Sorowako operations and have been adjusted to reflect our 44.3% ownership interest. The reported mineral reserves may differ in quantity or quality from those reported in other jurisdictions, under different standards.

(4) Estimated consolidated nickel mineral reserves include 3.9 million dry metric tons of stockpile.
Recovery range is overall metal recovered to point of first material sale.

In Canada, our Sudbury operations mineral reserves increased in 2021 by 5% (2.7Mt) due to conversion of mineral resource and redesign evaluation at Copper Cliff, Totten and Creighton mines, partially offset by mining depletion. At Voisey's Bay, Canada, our mineral reserves decreased mainly due to mining depletion. In Indonesia, the mineral reserves at the PTVI operations increased by 8% (3.8Mt) due to conversion of mineral resources and pit re-designs. The mineral reserves at Onça Puma, in Brazil, increased by 6% (6.3 Mt) due to conversion of mineral resource after updated geological and mine design.

We continue to operate and produce from our mine in Thompson and we are also conducting technical studies aiming to convert mineral resource into mineral reserves.

	Nickel Mineral Resources as of December 31, 2021 ⁽¹⁾⁽²⁾			
	Tonnage in millions of dry metric tons. Grades in %			
	Measured	Indicated	Measured and Indicated	Inferred

	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade
<i>Canada</i>								
Sudbury	7.3	1.24	50.5	1.59	57.9	1.54	8.6	2.1
Thompson	4.3	2.10	14.3	1.94	18.6	1.98	7.3	1.7
Voisey's Bay	4.1	0.95	-	-	4.1	0.95	5.9	1.8
<i>Indonesia (3)</i>								
PTVI								
Saprolite (4)	1.4	1.56	79.5	1.71	80.9	1.71	45.7	1.9
Limonite (5)	22.6	1.33	23.5	1.31	46.2	1.32	-	-
<i>Brazil</i>								
Onça Puma	15.4	1.37	23.2	1.28	38.6	1.32	5.1	1.2
Total	55.1	1.37	191.0	1.59	246.4	1.54	72.5	1.8

- (1) Mineral resources are reported exclusive of those mineral resources converted to mineral reserves. Tonnage is in millions of dry metric tons. Ni grades are in (%). The point of reference for the resource estimate is in situ, for PTVI and Onça Puma the point of reference is dry recovered tons to the processing plant.
- (2) The mineral resource prospects of economic extraction were determined based on prices ranging from: US\$13,376/t to US\$18,000/t, depending on the mine. Variations in price for different mines are associated with timing of the associated estimate.
- (3) PTVI mineral resources have been adjusted to reflect our 44.3% ownership interest. The reported mineral resources may differ in quantity or quality from those reported in other jurisdictions, under different standards.
- (4) The PTVI nickel saprolite mineral resources includes material from Sorowako operations, Bahodopi 2-3 and Pomalaa projects.
- (5) The PTVI nickel limonite mineral resources includes only Pomalaa project material.

	Type	Nickel ore mines			Vale interest (%)
		Operating since	Projected exhaustion date – 2021(1)	Projected exhaustion date – 2020(2)	
<i>Canada</i>					
Sudbury	Underground	1885	2043	2043	100.0
Thompson	Underground	1961		-	100.0
Voisey's Bay(3)	Open pit/ Underground	2005	2035	2034	100.0
<i>Indonesia</i>					
PTVI	Open pit	1977	2045	2045	44.3
<i>Brazil</i>					
Onça Puma	Open pit	2011	2074	2067	100.0

- (1) Indicates the life-of-mine for the operating mine with the longest projected exhaustion date in the complex, as of December 31, 2021.
- (2) Projected exhaustion dates estimated as of December 31, 2020. Projected exhaustion dates in this column are superseded by the estimates indicated under "Projected exhaustion date – 2021."
- (3) Voisey's Bay is transitioning from an open pit mine to an underground mine.

COPPER MINERAL RESERVES AND MINERAL RESOURCES

	Copper Mineral Reserves as of December 31, 2021 ⁽¹⁾⁽²⁾								
	Tonnage in millions of dry metric tons. Grades in (%)								
	Proven – 2021		Probable – 2021		Total – 2021		Total – 2020		Recovery Range(5)
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	%
<i>Canada</i>									
Sudbury	18.9	1.94	35.0	1.40	53.8	1.59	51.1	1.63	85-95
Voisey's Bay	11.6	0.87	15.3	0.83	26.8	0.85	28.6	0.86	85-95

RESERVES AND RESOURCES

<i>Brazil</i>									
Sossego(3)	1.5	0.83	83.9	0.61	85.3	0.62	98.3	0.69	90-95
Salobo(4)	231.0	0.69	902.4	0.60	1,133.4	0.62	1,157.1	0.59	80-90
Total	262.9	0.79	1,036.5	0.63	1,299.4	0.66	1,335.0	0.64	

- (1) Tonnage is in millions of dry metric tons. Cu grades are in (%). Point of reference for the mineral reserve estimate is the point of delivery to the process plant
- (2) The mineral reserve economic viability was determined based on long-term price of US\$7,500/t for copper.
- (3) Estimated consolidated copper mineral reserves include 38.6 million dry metric tons of stockpile.
- (4) Estimated consolidated copper mineral reserves include 206.1 million dry metric tons of stockpile.
- (5) Recovery range is overall metal recovered to point of first material sale.

In Canada, the mineral reserves for our Sudbury and operations increased, and decreased at Voisey's Bay in 2021 for the same reasons discussed above in connection with the nickel reserves. In Brazil, the mineral reserves for Sossego operations decreased by 13% (13Mt) mainly due to depletion. In addition, most of the proven mineral reserves were downgraded to probable after the results of a drill spacing analysis and reconciliation results confirmed the spacing is not sufficient to support proven. The pit is nearing end of life and options to drill test are under evaluation. At Salobo operations the mineral reserves decreased by 2% (23Mt) mainly due to mining depletion and updates to the geological model and mining plan. The proven mineral reserves increased due to model and pit reviews.

Copper Mineral Resources as of December 31, 2021 ⁽¹⁾⁽²⁾									
Tonnage in millions of dry metric tons. Grades in (%)									
	Measured		Indicated		Measured and Indicated		Inferred		
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
<i>Canada</i>									
Sudbury	7.3	0.93	50.5	2.19	57.9	2.04	8.6	2.5	
Voisey's Bay	4.1	0.77	-	-	4.1	0.77	5.9	0.8	
<i>Brazil</i>									
Sossego	162.6	0.72	152.9	0.84	315.5	0.78	21.7	0.8	
Salobo	30.2	0.39	439.4	0.49	469.7	0.48	268.9	0.5	
Alemão	61.0	1.63	54.4	1.33	115.4	1.49	0.1	1.7	
<i>Indonesia</i>									
Onto (3)	-	-	851.7	0.96	851.7	0.96	793.7	0.7	
Total	265.2	0.90	1,548.9	0.87	1,814.3	0.87	1,098.9	0.7	

- (1) Mineral resources are reported exclusive of those mineral resources converted to mineral reserves. Tonnage is in millions of dry metric tons. Cu grades are in (%). Point of reference for the mineral resource estimate is in situ.
- (2) The mineral resource prospects of economic extraction were determined based on prices ranging from US\$5,250-7,500/t for copper, depending on the mine. Variations in price for different mines are associated with timing of the associated estimate.
- (3) Onto mineral resource has been adjusted to reflect our 80% ownership interest. The reported mineral resources may differ in quantity or quality from those reported in other jurisdictions, under different standards

	Type	Copper ore mines			Vale interest (%)
		Operating since	Projected exhaustion date – 2021(1)	Projected exhaustion date – 2020(2)	
<i>Canada</i>					
Sudbury	Underground	1885	2043	2043	100.0
Voisey's Bay	Open pit/ Underground	2005	2035	2034	100.0
<i>Brazil</i>					
Sossego.....	Open pit	2004	2028	2028	100.0

Salobo	Open pit	2012	2053	2052	100.0
(1)	Indicates the life-of-mine for the operating mine with the longest projected exhaustion date in the complex, as of December 31, 2021.				
(2)	Projected exhaustion dates estimated as of December 31, 2020. Projected exhaustion dates in this column are superseded by the estimates indicated under "Projected exhaustion date – 2021."				

PGMS AND OTHER PRECIOUS METALS MINERAL RESERVES AND MINERAL RESOURCES

We expect to recover significant quantities of precious metals as byproducts of our Sudbury, Sossego and Salobo operations.

Precious Metals Mineral Reserves as of December 31, 2021 ⁽¹⁾⁽²⁾									
Tonnage in millions of dry metric tons. Grade in grams per dry metric ton									
	Proven – 2021		Probable – 2021		Total – 2021		Total – 2020		Recovery range ⁽⁶⁾ (%)
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
<i>Canada</i>									
Sudbury									
Platinum	18.9	1.22	35.0	1.12	53.8	1.16	51.1	1.19	70-75
Palladium.	18.9	1.19	35.0	1.49	53.8	1.38	51.1	1.39	70-80
Gold ⁽²⁾	18.9	0.51	35.0	0.39	53.8	0.43	51.1	0.43	60-75
<i>Brazil</i>									
Sossego									
Gold ⁽³⁾	1.5	0.23	83.9	0.17	85.4	0.18	98.3	0.19	75-80
Salobo									
Gold ⁽⁴⁾	231.0	0.40	902.4	0.34	1,133.4	0.35	1157.1	0.31	60-70
Total Pt + Pd ⁽⁵⁾	18.9	2.41	35.0	2.61	53.8	2.55	51.1	2.59	
Total Gold	251.4	0.41	1,021.2	0.33	1,272.6	0.34	1,306.4	0.30	

- (1) Tonnage is in millions of dry metric tons. Grade is grams per dry metric ton. Point of reference for the mineral reserve estimate is the point of delivery to the process plant.
- (2) The mineral reserve economic viability was determined based on long-term prices of: US\$1,200/oz for platinum, US\$1,400/oz for palladium, US\$1450/oz for gold. Gold reserves are reported on 100% basis and do not deduct the streaming amounts. For a description of our streaming arrangements with Wheaton, see Section 2.3 PGM's and other Precious Metals.
- (3) Estimated consolidated mineral reserves include 38.6 million dry metric tons of stockpile.
- (4) Estimated consolidated mineral reserves include 206.1 million dry metric tons of stockpile.
- (5) Pt+Pd is the sum of Platinum and Palladium grades.
- (6) Recovery range is overall metal recovered to point of first material sale.

In Sudbury, our reserve estimates for platinum, palladium and gold increased for the same reasons discussed above in connection with the nickel reserves. In Brazil, reserve estimates for gold changed for the same reasons discussed above in connection with the copper reserves.

Precious Metals Mineral Resources as of December 31, 2021 ⁽¹⁾⁽²⁾									
Tonnage in millions of dry metric tons. Grade in grams per dry metric ton									
	Measured		Indicated		Measured and Indicated		Inferred		
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
<i>Canada</i>									
Sudbury									
Platinum	7.3	0.51	50.5	0.92	57.9	0.87	8.6	1.5	
Palladium	7.3	0.61	50.5	1.17	57.9	1.10	8.6	1.8	
Gold	7.3	0.20	50.5	0.38	57.9	0.35	8.6	0.6	
<i>Brazil</i>									
Sossego									
Gold	162.6	0.12	152.9	0.10	315.4	0.11	21.7	0.1	

RESERVES AND RESOURCES

Salobo								
Gold	30.2	0.17	439.4	0.25	469.7	0.24	268.9	0.3
Alemão								
Gold	61.0	1.26	54.4	0.95	115.4	1.11	0.1	1.1
Indonesia								
Onto ⁽³⁾	-	-	851.7	0.58	851.7	0.58	793.7	0.4
Gold	-	-	851.7	0.58	851.7	0.58	793.7	0.4
Total Pt + Pd ⁽⁴⁾	7.3	1.12	50.5	2.08	57.9	1.97	8.6	3.3
Total Gold	261.1	0.39	1,548.9	0.45	1,810.2	0.44	1,093.0	0.4

- (1) Mineral resources are reported exclusive of those mineral resources converted to mineral reserves. Tonnage is in millions of dry metric tons. Grade is grams per dry metric ton. Point of reference for the mineral resource estimate is in situ.
- (2) The mineral resource prospects of economic extraction were determined based on prices of: US\$1,150 – 1,225/oz for platinum, US\$750-1,093/oz for palladium and US\$1,200- US\$1,373/oz for gold, in each case depending on the mine. Variations in price for different mines are associated with timing of the associated estimate.
- (3) Onto mineral resource has been adjusted to reflect our 80% ownership interest. The reported mineral resources may differ in quantity or quality from those reported in other jurisdictions, under different standards.
- (4) Pt+Pd is the sum of Platinum and Palladium grades.

	Type	Operating since	Precious metals mines		Vale interest (%)
			Projected exhaustion date – 2021 ⁽¹⁾	Projected exhaustion date – 2020 ⁽²⁾	
Canada					
Sudbury	Underground	1885	2043	2043	100.0
Brazil					
Sossego	Open pit	2004	2028	2028	100.0
Salobo	Open pit	2012	2053	2052	100.0

- (1) Indicates the life-of-mine for the operating mine with the longest projected exhaustion date in the complex, as of December 31, 2021.
- (2) Projected exhaustion dates estimated as of December 31, 2020. Projected exhaustion dates in this column are superseded by the estimates indicated under "Projected exhaustion date – 2021."

COBALT MINERAL RESERVES AND MINERAL RESOURCES

	Cobalt Mineral Reserves as of December 31, 2021 ⁽¹⁾⁽²⁾								Recovery Range(4) %
	Tonnage in millions of dry metric tons. Grades in %								
	Proven – 2021		Probable – 2021		Total – 2021		Total – 2020		
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
Canada									
Sudbury	18.9	0.04	35.0	0.03	53.8	0.04	51.1	0.04	20-30
Voisey's Bay ⁽³⁾	11.6	0.13	15.3	0.12	26.8	0.12	28.6	0.12	70-80
Total	30.4	0.07	50.2	0.06	80.7	0.07	79.6	0.07	

- (1) Tonnage is in millions of dry metric tons. Co grades are % of cobalt. The point of reference for the mineral reserve estimate is the point of delivery to the process plant. Recovery range is overall metal recovered to point of first material sale.
- (2) The mineral reserve economic viability was determined based on long-term prices of: US\$50,000/t for cobalt.
- (3) Cobalt reserves are reported on 100% basis and do not deduct the streaming amounts. For a description of our cobalt streaming arrangements, see *Lines of Business–Base Metals–Cobalt*.
- (4) Recovery range is overall metal recovered to point of first material sale.

	Cobalt Mineral Resources as of December 31, 2021 ⁽¹⁾⁽²⁾			
	Tonnage in millions of dry metric tons. Grades in %			
	Measured	Indicated	Measured and Indicated	Inferred

	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade
<i>Canada</i>								
Sudbury	7.3	0.05	50.5	0.04	57.9	0.04	8.6	0.05
<i>Sudbury</i>								
Voisey's Bay	4.1	0.04	-	-	4.1	0.04	5.9	0.12
<i>Indonesia</i>								
PTVI ⁽³⁾⁽⁴⁾	22.6	0.15	59.6	0.08	82.3	0.10	8.3	0.05
Total	34.0	0.12	110.1	0.06	144.3	0.07	22.8	0.07

(1) Mineral resources are reported exclusive of those mineral resources converted to mineral reserves. Tonnage is in millions of dry metric tons. Co grades are % of cobalt. The point of reference for Sudbury and Voisey's Bay mineral resource estimate is in situ, for PTVI the point of reference is dry recovered tons to the process plant.

(2) The mineral resource prospects of economic extraction were determined based on prices ranging from US\$: US\$27,500-US\$45,000/t, depending on the mine. For Pomalaa - cobalt price of US\$56,425. Variations in price for different mines are associated with timing of the associated estimate.

(3) The mineral resource for the PTVI property has been adjusted to reflect our 44.3% ownership interest.

(4) The PTVI cobalt mineral resources includes only Pomalaa project material.

Our cobalt reserve estimates decreased in 2020 for the same reasons discussed above in connection with the nickel mineral reserves.

		Cobalt ore mines			
Type	Operating since	Projected exhaustion date – 2021 ⁽¹⁾	Projected exhaustion date – 2020 ⁽²⁾	Vale interest (%)	
<i>Canada</i>					
Sudbury	Underground	1885	2043	100.0	
Voisey's Bay	Open pit/ Underground	2005	2034	100.0	

(1) Indicates the life-of-mine for the operating mine with the longest projected exhaustion date in the complex, as of December 31, 2021.

(2) Projected exhaustion dates estimated as of December 31, 2020. Projected exhaustion dates in this column are superseded by the estimates indicated under "Projected exhaustion date – 2021." under "Projected exhaustion date – 2021."

CAPITAL EXPENDITURES

Our investment guidance for capital expenditures in 2022 is approximately US\$5.8 billion, including operations sustaining, replacement and growth projects.

	2021 expenditures ⁽¹⁾	2020 expenditures ⁽¹⁾
	(US\$ million)	
Project execution (construction in progress)	999	522
Investments to sustain existing operations and replacement projects (property, plant and equipment)	4,034	3,705
Total	5,033	4,227

(1) Executed capital expenditures comprise the sum of cash outflows.

The following table sets forth total expenditures in 2021 for our main investment projects and expenditures budgeted for those projects in 2022, together with estimated total expenditures for each project and the actual or estimated start-up date of each project as of December 31, 2021.

Business area	Main projects ⁽¹⁾	Actual or Estimated start-up	Executed CAPEX		Expected CAPEX	
			2021 ⁽²⁾	Total executed ⁽³⁾	2022 ⁽⁴⁾	Total expected ⁽⁵⁾
(US\$ million)						
Base Metals: Nickel	VBME	2H22	562	1,474	651	2,690
Iron ore	Gelado	2H22	86	271	61	428
Base Metals: Copper	Salobo III	2H22	314	667	341	1,056
Iron ore	Northern System 240 Mt Program	2H22	198	386	135	772
Iron ore	Serra Sul 120	2H24	151	155	398	1,548
Iron ore	Capanema	2H23	27	32	216	495

(1) Projects approved by our Board of Directors.

(2) Executed capital expenditures comprise the sum of cash outflows.

(3) Total executed CAPEX through December 31, 2021, including capital expenditures in prior periods.

(4) Figure presented corresponds to the investment guidance for capital expenditures in 2022 of approximately US\$5.8 billion.

(5) Estimated total capital expenditure cost for each project, including capital expenditures in prior periods. Total expected CAPEX includes expenses, in line with the budget approved by our Board of Directors, while these expenses are not included in the expected CAPEX for the year or in the total executed CAPEX figures.

Our key investment projects are described in more detail below:

The **Serra Sul 120 project** was approved by our Board of Directors in August 2020. This project consists of increasing the S11D mine-plant capacity by 20 Mtpy, to a total of 120 Mtpy at site. This project is expected to result in an increase of the Northern System's mine-plant capacity to 260 Mtpy. The project has total multiyear investments of US\$1.5 billion and its start-up is expected for the second half of 2024. The project includes: (i) the opening of new mining areas; (ii) the duplication of the existing long-distance belt conveyor; (iii) the implementation of new processing lines at the plant; and (iv) the expansion of storage areas, among other measures. Serra Sul 120 will create an important buffer of productive capacity, ensuring greater operational flexibility to face eventual production or licensing restrictions in the Northern System.

The **Voisey's Bay underground mine expansion project ("VBME") project** is expected to extend the mine life of Voisey's Bay and to increase Voisey's Bay production to an estimated annual production of around 45 kt of nickel, on

average, about 20 kt of copper and about 2.6 kt of cobalt, in total. VBME will replace existing Voisey's Bay open-pit mine production, thus being recorded as a sustaining investment for the purpose of the dividend policy. The project has experienced increased costs due to both internal and external factors. The total expected investment increased to US\$2.690 billion, mainly due to: (i) COVID-19 impact and changes to the construction schedule, (ii) scope change to engineering design, (iii) higher than anticipated logistic and sourcing costs. In 2Q21, we achieved the first ore production of Reid Brook deposit, the first of two underground mines to be developed in the project. The start-up of the second deposit, Eastern Deeps, is expected by the second semester of 2022. The project is 67% complete.

The **Gelado project**, approved in September 2018 by our Board of Directors, is expected to recover approximately 10 Mtpy of pellet feed with high iron content in the Carajás Complex, in order to feed the São Luís pellet plant. The project reached a physical progress of 87% and start-up expected for the second semester of 2022.

The **Salobo III copper project**, approved in October 2018 by our Board of Directors, is a brownfield expansion of our Salobo operations, increasing processing throughput capacity. The project encompasses a third concentrator line and will use Salobo's existing infrastructure. Salobo III is expected to produce an average copper volume of approximately 50 ktpy in the first 5 years, 42 ktpy in the first 10 years and 36 ktpy throughout the life of mine. Start-up is scheduled for the second half of 2022 with a ramp up of 15 months. In 2021, the project achieved 85% of the physical progress completion, with civil works nearly complete, electro mechanical assembly well advanced and the main substation commissioned energized.

The **Northern System 240 Mt Program**, approved in December 2018 by our Board of Directors, will expand the S11D's production capacity and the Northern System logistics capacity by 10 Mtpy. The mine-plant project front has start-up expected until the end of 2022 and the logistics project front has start-up expected for the second half of 2023. In 2021, the project's mine-plant physical progress reached 91%, with the partial completion of earthworks, the replacement of crushers, advances in the assembling of the Line 3 of the railway's reverse loop and the issuance of the installation permit for both mine and plant, among other measures.

The **Capanema project**, approved in December 2020 by our Board of Directors, includes investments in the Capanema mine to reopen the facilities and acquire new equipment, and to construct a long-distance conveyor belt, as well as adjustments in the Timbopeba stockyards, totaling expected multiyear investments of US\$495 million. The start-up is expected for the second half of 2023, with a production capacity by natural moisture (without tailings generation) of 18 Mtpy and in the first years will bring us a net addition of 14 Mtpy of capacity with the expedition through the Timbopeba site.

We have also been developing the following projects:

Solar Project – Sol do Cerrado. This project was announced in December 2020 and contemplates the construction of a photovoltaic plant, including 17 sub-parks that total an installed capacity of 766 megawatts peak (MWp) in the municipality of Jaíba, in the state of Minas Gerais, Brazil. It also includes the implementation of an elevator substation, transmission line and connection bay at the 230 kV Jaíba substation, with contracts signed for connection to the Brazilian National Interconnected System. The implementation of the project will require investments of approximately US\$500 million. The project will produce approximately 193 average megawatts (MWa) of energy per year for our operations, corresponding to 13% of our estimated demand in 2025, and its operational start-up is expected for the fourth quarter of 2022. Solar generation, located in the Southeastern region, also optimizes the generation profile of our portfolio, which is based on hydro generation.

West III Project (Zhejiang Province, China). In October 2020, our Board of Directors approved the creation of a joint venture company with Ningbo Zhoushan Port Company Limited ("Ningbo Zhoushan Port"), a subsidiary of Zhejiang Provincial Seaport Investment & Operation Group Co. Ltd. (Ningbo Zhoushan Port Group Co. Ltd.), to build, own and operate the West III Project in Shulanghu Port, Zhoushan City, Zhejiang Province, China. The project consists in expanding the Shulanghu Port facilities, developing a stockyard and loading berths with additional 20 Mtpy capacity. Our investments are estimated between US\$110 million and US\$160 million, and by participating in the project, we will secure a total port capacity of 40Mtpy in Shulanghu, which will help us to optimize our overall supply chain costs. The

project and the creation of the joint venture is still subject to approval by the Chinese Government. The start-up of the project is expected by 2026.

Briquetting plants. In December 2020, we approved the conversion of pelletizing plants 1 and 2 at the Tubarão Unit, into iron ore briquetting plants and also the construction of a new briquetting plant in the Vargem Grande Complex. The initial production capacity will be approximately 7 Mtpy. The start-up of the three plants is expected by 2023, and total investment amounts to US\$185 million.

Thompson Phase 1 Project. In June, 2021, we approved a US\$123 million investment for the execution of the Thompson Phase 1 Project, which will extend current mining activities in Thompson, Manitoba for 10 years. The Thompson Mine Extension is a two-phase project and includes the construction of critical infrastructure, such as new ventilation raises and fans, increased backfill capacity and additional power distribution. The start-up of the project is expected by 2023, replacing capacity at a rate of 20 ktpy of nickel.

Tecnored plant. In April 2022, we started the construction works of Tecnored's first commercial plant in Marabá, in the state of Pará. The plant will initially have a production capacity of 250 ktpy of green pig iron and may reach 500 ktpy in the future. The start-up is planned for 2025 with an estimated investment of approximately US\$374 million.

REGULATORY MATTERS

We are subject to a wide range of governmental regulation in all the jurisdictions in which we operate worldwide. The following discussion summarizes the kinds of regulation that have the most significant impact on our operations.

MINING RIGHTS AND REGULATION OF MINING ACTIVITIES

Mining and mineral processing are subject to extensive regulation. In order to conduct these activities, we are required to obtain and maintain some form of governmental or private permits, which may include concessions, licenses, claims, tenements, leases or permits (all of which we refer to below as “concessions”). The legal and regulatory regime applicable to the mining industry and governing concessions differs among jurisdictions, often in important ways. In most jurisdictions, including Brazil, mineral resources belong to the government and may only be exploited pursuant to a governmental concession. In other jurisdictions, such as Ontario in Canada, a substantial part of our mining operations is conducted pursuant to mining rights we own (private permits). Government agencies are typically in charge of granting mining concessions and monitoring compliance with mining law and regulations.

The table below summarizes our main mineral rights and mining concessions for our operations, not limited to areas within the mineral reserves and mineral resources footprint.

Location	Mining title	Approximate area covered (in hectares)	Expiration date
Brazil		535,188	Indefinite
	Mining Concessions	294,629	Indefinite
	Application for Mining concessions	240,559	-
Canada⁽¹⁾		435,923	2021 – 2042
Ontario		105,469	2021 – 2042
	Patented mineral rights	81,145	Indefinite
	Mineral Leases	21,188	2021-2042
	Mining Licenses of occupation	3,136	Indefinite
Manitoba		111,693	2021 – 2034
	Order in Council leases	109,043	2021-2025
	Mineral Leases	2,650	2034
Newfoundland and Labrador	Mining Leases	1,599	2027
Indonesia⁽²⁾	Contract of work	118,017	2025

(1) Applications submitted in 2020 are still in the process of being approved. All conditions required for the renewal were fulfilled. This process usually takes several months and we can continue to operate while the approval process is ongoing.

(2) The contract of work entered into by PTVI and the Indonesian government will expire in 2025. PTVI is entitled to two 10-year extensions, subject to government approval.

In addition to the concessions listed above, we have licenses and applications that allow us to explore 2.78 million hectares in Brazil and 1.6 million hectares in other countries.

In 2020 and 2021, there were several developments to the Brazilian legislative and regulatory framework concerning the operation of dams, such as the prohibition to install mining dams in areas where studies identify the existence of a community in the Self-Rescue Zone, except for particular cases such as dams that are already under installation or operation and comply with certain legal requirements.

In 2020 and 2021, there were also changes and new provisions related to mandatory financial guarantees, guidelines for the preparation of Emergency Action Plans, deadlines for the de-characterization of upstream dams and the establishment of new sanctions, including fines of up to R\$1 billion and the requirement to submit Mine Closure Plans to the National Mining Agency (ANM) by May 2022. Mine Closure Plans must provide the procedures for the decommissioning of the mining area and its recovery. In addition, it must provide for the de-characterization (or, if not possible, at least the monitoring) of existing dams, regardless of whether the cessation of mining activities is not due to the exhaustion of the deposit.

In February 2022, the ANM published Resolution No. 95/2022, consolidating the content of several rules related to mining dams' safety. The new regulation presents some new features relating to mining dam safety obligations, such as: (i) a new classification of dams in terms of operational management; (ii) the regulation of the existing prohibition of communities and workers located in Self-Rescue Zones; (iii) compatibilization of deadlines for decharacterization of upstream dams provided for in federal and state regulations; (iv) objective criteria for each level of Alert and Emergency situation; (v) requirement for the designation of an Engineer of Record (EoR) for all dams with high associated potential damage (DPA); (vi) requirement for dams with high DPA to implement a Risk Management Process for the Mining Dam (PGRBM), by December 31, 2022; (vii) requirements for the agreement and acknowledgement by highest-ranking executive in connection with documents related to the dam safety plan; (ix) mandatory decharacterization of dams and operational structures located downstream of a dam which existence compromises their safety, until August 15, 2022; (x) possibility of embargo and suspension of dams and mining complexes in certain situations.

We are implementing tailings filtration and storage methods that do not rely on dams to continue operating some of our mines and plants. We have approved projects and further studies are in progress, to apply a technology for residue disposal that filters and stocks partially or totally dewatered tailings, which will reduce our reliance on tailing dams in the medium and long term. These technologies may increase our production costs and require additional investments in our mines and plants.

In Canada, Vale negotiated with the Government of Manitoba the renewal of its mining rights, originally explored under Order in Council Leases, through the conversion to the regime of Mining leases and Claims in accordance with the applicable law. The process of conversion started in 2021 and will continue until 2025.

In Indonesia, the government issued new regulation in September 2021 on the implementation of mineral and coal mining business activities. Such regulations may have a material impact on the operations of PTVI, including with respect to the total area exploited by PTVI and period of exploration.

ROYALTIES AND OTHER TAXES ON MINING ACTIVITIES

We are required in many jurisdictions to pay royalties or taxes on our revenues or profits from mineral extractions and sales. These payments are an important element of the economic performance of a mining operation. The following royalties and taxes apply in some of the jurisdictions in which we have our largest operations:

Brazil. We are required to pay a royalty known as CFEM (*Compensação Financeira pela Exploração de Recursos Minerais*) on the revenues from the sale of minerals we extract. The calculation of the CFEM is done as follows: (i) for domestic sales, the basis for calculation of CFEM is the revenue from sales, net of sales taxes levied; (ii) for exports, the basis for calculation of CFEM is the highest amount between the revenue from the exports and the amount equivalent to the transfer pricing in federal income tax legislation; and (iii) for a company's internal mineral consumption, the basis for calculation of CFEM is the value equivalent to the current price of the ore in the domestic market, the international markets or a reference value, as to be determined by the Brazilian National mining agency (*Agencia Nacional de Mineração* – "ANM"). The current CFEM rates are: 3.5% for iron ore; 2% for copper, nickel and other materials; 3% for bauxite and manganese ore.

Brazilian states. Several Brazilian states, including Minas Gerais, Pará and Mato Grosso do Sul, impose a tax on mineral production (*Taxa de Fiscalização de Recursos Minerais*—"TFRM"), which is currently assessed at rates ranging from R\$0.50 to R\$4.1297 per metric ton of minerals produced in or transferred from the state. In March 2021, a state decree increased

the TFRM rate in the state of Pará to R\$12.3891 per metric ton, with effectiveness as of April 2021. We have not implemented the new rates as we understand that, under applicable principles of Brazilian constitutional law, the tax increase would only come into force in the year subsequent to its enactment. For the year 2022, we understand that the new rates are also not applicable. In December 2021, the government of Ourilândia do Norte, in the state of Pará, enacted a law imposing TFRM on nickel ore extracted or processed in the territory, at a rate of R\$5.14 per kilogram. We are evaluating the legal aspects and economic effects of this new tax. Other companies and an industry association currently dispute the legality of the TFRM in a number of legal proceedings, including before the Federal Supreme Court (*Supremo Tribunal Federal*—“STF”).

Canada. The Canadian provinces in which we operate charge us a tax on profits from mining operations. Profit from mining operations is generally determined by reference to gross revenue from the sale of mine output and deducting certain costs, such as mining and processing costs and investment in processing assets. The statutory mining tax rates are 10% in Ontario; with graduated rates up to 17% in Manitoba; and a combined mining and royalty tax rate of 16% in Newfoundland and Labrador. The mining tax paid is deductible for corporate income tax purposes.

Indonesia. PTVI pays mining royalties of 2% on its nickel matte revenues when LME nickel prices are below US\$21,000 per metric ton and 3% of its nickel matte revenues when LME nickel prices are above or equal to US\$21,000 per metric ton.

ENVIRONMENTAL REGULATIONS

We are also subject to environmental regulations that apply to the specific types of mining and processing activities we conduct. We are required to obtain approvals, licenses, permits or authorizations from governmental authorities to construct and operate. In most jurisdictions, the development of new facilities requires us to submit environmental and social impacts assessments for approval and often to make investments to mitigate environmental and social impacts, and we must operate our facilities in compliance with the terms of the approvals, licenses, permits or authorizations.

Environmental legislation is becoming stricter worldwide, which could lead to greater costs for environmental compliance. Environmental regulations affecting our operations relate, among other matters:

- Emissions of pollutants into the air, soil and water, including greenhouse gases and climate change regulations
- Recycling and waste management
- Protection and preservation of forests, coastlines, caves, cultural heritage sites, watersheds and other features of the ecosystem
- Water use
- Financial provisions and closure plans required for mining licenses, including de-characterization, decommissioning, environmental liabilities and reclamation and remediation costs

Below is a discussion of some key regulatory matters:

Protection of caves. In Brazil, we are subject to extensive environmental regulation for protection of caves. In 2008, a federal decree amended the regulation for protection of caves that had been enacted in 1990 and established a criteria for classification of caves based on their relevance (maximum, high, medium or low), prohibiting interventions in areas of maximum relevance and allowing impact on areas of other degrees of relevance with proper environmental license. We are required to conduct extensive technical studies to identify the existence of caves and to determine degree of relevance of each identified cave. We are also required to negotiate compensatory measures with Brazilian environmental regulators in order to continue to operate in certain sites. In certain iron ore mining operations or projects, we may be required to limit or modify our mining plans or to incur additional costs to preserve maximum relevance caves or to compensate for the impact on non-maximum relevance caves, with potential consequences for production volumes, costs or reserves in our iron ore business. In January 2022, a new federal decree was enacted, amending the regulation for protection of caves, in particular with respect to relevance classifications and forms of compensation, and the impact on our operations is under review. This 2022 decree is currently being challenged in the STF by a political party claiming that it is unconstitutional, and it has been temporarily suspended until further decision of the court.

Protection of indigenous peoples rights. A Brazilian regulation for the protection of indigenous people, enacted in 2011 and revised in 2015, requires us to conduct specific impact assessments and implement mitigation programs in connection with operations and projects close to indigenous peoples' and Quilombola communities' territories.

Other environmental regulation in Brazil. There are also environmental regulatory obligations that could affect our operations or lead to compensatory measures related to native vegetation suppression in the state of Minas Gerais, the Atlantic Forest biome, flora species protected by law, permanent preservation areas and archaeological and cultural heritage. In addition, all new projects that include activities with a significant environmental impact must collect financial resources to support the implementation and maintenance of conservation areas, in order to comply with the environmental compensation obligation.

Climate change. We expect heightened attention from various governments to reducing greenhouse gas emissions as a result of concern over climate change, especially in view of the Paris Agreement. The entry into effect of the Paris Agreement in late 2016 increased international pressure for the establishment of carbon pricing, on single-jurisdiction, multi-jurisdiction, and global scales. This regulatory evolution, along with civil society and investor-driven concern, has added pressure on companies to adopt carbon pricing strategies. In 2021, a Rulebook was approved at the COP26, with the goal to provide practical guidance for and accelerate the implementation of the Paris Agreement and the creation of a global carbon market. We attended COP26 and participated in different panels where the issues above among others related to climate change were discussed. The pricing of greenhouse gas emissions may impact our operational costs, mainly through higher price for fossil fuels and higher costs for international freight.

Regulation of chemicals. Some of our products are subject to regulations applicable to the marketing, distribution and use of chemical substances present in their composition. For example, the European Commission has adopted a European Chemicals Policy, known as REACH ("Registration, Evaluation and Authorization of Chemicals"). Under REACH, European manufacturers and importers are required to register substances prior to their entry into the European market and in some cases may be subject to an authorization process. A company that fails to comply with the REACH regulations could face fines and penalties. We are compliant with the requirements of the EU REACH regulations. In addition, the U.K. and South Korea are currently implementing a regulation similar to REACH, and we anticipate further expansion of REACH-like regulations in other Asian countries.

Regulation of international maritime transportation. We are subject to health, safety and environmental regulation by the International Maritime Organization (IMO). IMO rules apply not only to the international shipping categories, but also to the types of cargoes transported, including special rules for iron ore, nickel and copper. The IMO is currently discussing further measures for enhancing the energy efficiency of international shipping and reducing its overall greenhouse gas emissions. In April 2018, reduction targets were defined as part of the IMO's initial strategy for curbing the sector's emissions. These targets include a 50% reduction in greenhouse gas emissions by 2050, based on 2008 levels. In June 2021, the IMO adopted amendments that will become effective in 2023 and that combine technical and operational approaches to improve the energy efficiency of ships. The new measures require all ships to calculate their Energy Efficiency Existing Ship Index ("EEXI") – a one-time certification, targeting design parameters – and to establish their annual operational Carbon Intensity Indicator ("CII"), which will have to comply with gradually decreasing carbon intensity parameters. The IMO will further detail its strategy and the measures to be adopted by 2023. These new requirements may increase our freight cost in the future. In 2016, the IMO approved regulation establishing limits for sulfur oxides emission limits, which became effective in 2020. This regulation may increase freight cost due to the need to use bunker with low sulfur content or to install additional pollutant control equipment (*i.e.* scrubbers) to limit air emissions. It is expected that further discussions on scrubber wash water regulations will be concluded in 2022, which could restrain the use of open loop scrubbers. Also, the International Convention for the Control and Management of Ships' Ballast Water and Sediments requires compliant ships during their international voyages to manage their ballast water and sediments in accordance with certain parameters. The convention became effective in September 2017 for new ships (those with keels laid after that date) and, for existing ships, the convention became effective in stages with specific deadlines depending on the vessel, beginning in September 2019, with the global fleet required to be fully compliant by September 2024. Such requirements may also result in increases in our freight and port operation costs. In 2021, the European Commission approved proposals to regulate international shipping emissions. Starting in 2023, shipping will be gradually introduced into the EU's Emissions Trading System (ETS), a carbon market that operates in all

EU countries targeting climate neutrality in the EU by 2050. That will require vessels visiting EU ports to improve their fuels greenhouse gas intensity (GHG) starting in 2025. These measures may increase our freight cost in the future.

BRAZILIAN REGULATION OF MINING DAMS

Under a 2022 regulation of ANM, companies operating mining dams in Brazil are required to comply with specific rules, including:

Audit: Companies operating mining dams must conduct two annual stability audits for each dam and prepare a stability report and the corresponding Stability Condition Statement (DCE). At least one of these audits must be conducted by external auditors. In our Brazilian operations, an external senior engineer (the EOR), not directly involved in the day-to-day operations, is responsible for conducting this audit regularly, as part of our governance procedures to evaluate safety and performance.

Dam Periodic Safety Reviews (RPSB—Revisão Periódica de Segurança de Barragem): The report must include detailed analysis of all dam's documentation, including projects and procedures, stability analysis of the structures and the impacts on surrounding communities, including hazards and rupture impact studies. The RPSB reports must be renewed each 3, 5 and 7 years for high, medium and low associated potential damage (DPA) respectively, and whenever any structural modifications are made. The RPSB is performed by an external company not linked to the EOR.

Emergency Action Plan of Mining Dams Training: All mining dams must have an emergency action plan, and employees and local communities must be trained.

In 2019, the ANM issued a resolution on dam safety requiring companies that own upstream dams to submit a technical de-characterization project and to fully de-characterize such structures within the upcoming years. Also, a wide range of measures were imposed to ensure the stability and safety of mining dams and their monitoring and warning systems. In addition, the resolution sets forth a minimum safety factor and the obligation for a DCE to be signed by an individual at a higher level in the hierarchy of the company jointly with the technical individual responsible for its preparation.

Also in 2019, the state of Minas Gerais enacted a law prohibiting the increase and the construction of any upstream dam. The statute also prohibits the increase, modification or construction of any dam if communities are established within its Self-Rescue Zone, an area which encompasses the portion of the valley downstream of the dam where timely evacuation and intervention by the competent authorities in emergency situations is not possible.

In 2020, a federal law modified the National Dam Safety Policy, reinforcing the prohibition of constructing and raising upstream dams in Brazil. The statute also requires companies to de-characterize the structures built using the upstream method by 2022.

For dams already installed or in operation with communities in Self-Rescue Zones, the law requires (a) the de-characterization of the structure, (b) the resettlement the population and recovery of the cultural heritage, or (c) carry out reinforcement works to ensure the structural stability.

REGULATION OF OTHER ACTIVITIES

We are subject to comprehensive regulatory regimes for some of our other activities, including rail transport, port operations and electricity generation. We are also subject to more general legislation on workers' health, safety, and support of communities near mines, and other matters. The following descriptions relate to some of the other regulatory regimes applicable to our operations:

Brazilian railway regulation. Our Brazilian railroad business operates pursuant to concession agreements granted by the federal government, and our railroad concessions are subject to regulation and supervision by the Brazilian Ministry of Infrastructure and Brazilian transportation regulatory agency, ANTT (*Agência Nacional de Transportes Terrestres*). The

concessions for EFC and EFVM were recently renewed for 30 years, and will expire in 2057, upon commitment of investments (such as urban and infrastructure works) and payment of grant. Such investments are subject to risks inherent to the execution of works, including delays. Delays may result in sanctions by ANTT, as provided in the concession agreements. VLI has also been awarded a subconcession contract for commercial operation of a 720-kilometer segment of the FNS railroad in Brazil, which expires in 2037. FCA and MRS concessions expire in 2026 and they may be renewed for 30 years at the federal government's discretion. Rail transportation prices can be negotiated directly with the users of such services, subject to a price cap set forth in the concession agreements and annually reviewed by ANTT for each of the concessionaires and for the different products transported. ANTT regulations also require concessionaires to give trackage rights to other railway operators, to make investments in the railway network, and to meet certain productivity and safety requirements, among other obligations.

Brazilian port regulation. Port operations in Brazil are subject to regulation and supervision by ANTAQ, the federal agency in charge of maritime transportation services, and by the Ministry of Infrastructure through the National Secretariat of Ports and Aquatic Transport (SNPTA), whose purpose is to formulate policies and guidelines. The agreements to operate our private terminals are valid until 2039 and may be renewed for equal periods, with the exception of the Leases for the Copper Terminal (Itaqui port, state of Maranhão) and for CPBS (Itaguaí Port, state of Rio de Janeiro), which expire in 2023 and 2026, respectively, currently under process for being renewed for additional 20 and 25 years, respectively, at the discretion of the Federal Government.

DISCONTINUED OPERATIONS

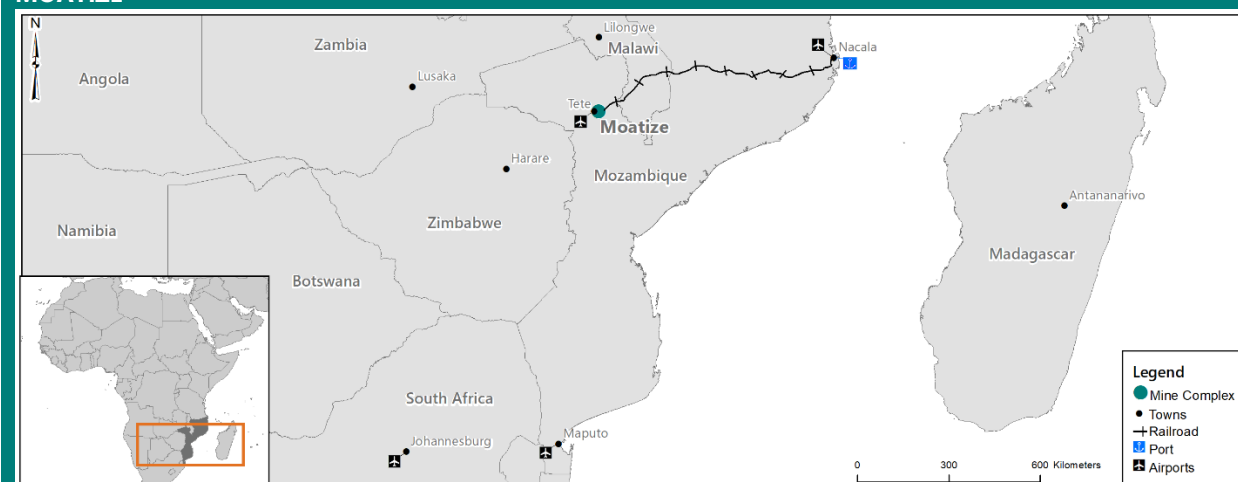
COAL

In December 2021, we entered into a binding agreement with Vulcan, an affiliate of the Jindal Group, to sell our coal operations, which consist of Moatize mine and the Nacala Logistics Corridor, for US\$270 million, plus a 10-year royalty agreement subject to certain mine production and coal price conditions. The closing of the transaction is subject to the satisfaction of customary conditions precedent, including but not limited to the approval of the Ministry of Mineral Resources and Energy of Mozambique, the approval of the Government of Mozambique for the change of control and antitrust.

Considering the agreement to sell the coal operations, we are not reporting mineral resources or mineral reserves of coal properties.

COAL OPERATIONS

MOATIZE



Ownership interest

We currently have an indirect 95% stake and the remaining stake is owned by Empresa Moçambicana de Exploração Mineira, S.A. Upon completion of the sale to Vulcan, we will have no equity interest in these operations, but will be entitled to receive royalties for 10 years, subject to certain mine production and coal price conditions

Location

Moatize, Mozambique

Current Operator

Vale Mozambique

Mineral title

One mining concession covering 25,262 hectares and expiring in 2032, which may be extended for an additional 25-year period, subject to approval by the government of Mozambique.

Stage/ Operations

Open cut mine, which was developed directly by us. Operations started in August 2011 and are expected to reach a nominal production capacity of 18 Mtpy, considering the Moatize expansion, comprised of metallurgical and thermal coal and the Nacala Logistics Corridor ramp up.

Key permit conditions

We have or expect to obtain in a timely manner the necessary permits for operations.

Mine types and mineralization styles

Moatize is a multi-seam coal deposit of Permian age that hosts both thermal coal and coking coal designed to be operated as open cut truck.

Associated facilities and infrastructure	<p><i>Processing plant:</i> Moatize's main branded products are the Moatize Low Volatile (MLV) premium hard coking coal and Mabú (Primary mid volatile hard coking coal). There is two Coal Handling and Processing Plant (CHPP), each with a capacity of 4,000 metric tons per hour. Besides road infrastructure and waste storage area.</p> <p><i>Other facilities:</i> Waste and tailings disposal structures.</p> <p><i>Logistics:</i> The coal is transported by rail from the mine to the port at Nacala à Velha via the Nacala rail lines.</p> <p><i>Energy:</i> Supplied by local utility company. Back up supply on site.</p>
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Production

The following table sets forth information on our marketable coal production.

Operation	Mine type	Production for the year ended December 31,		
		2021	2020	2019
<i>(thousand metric tons)</i>				
<i>Metallurgical coal:</i>				
Moatize ⁽¹⁾	Open-cut	3,802	3,095	4,032
<i>Thermal coal:</i>				
Moatize ⁽¹⁾	Open-cut	4,695	2,783	4,738

(1) These figures correspond to 100% production at Moatize and are not adjusted to reflect our ownership.

III. OPERATING AND FINANCIAL REVIEW AND PROSPECTS

OVERVIEW

In 2021, we recorded net income from continuing operations of US\$24.844 billion, compared to US\$6.255 billion in 2020. Our Adjusted EBITDA from continuing operations increased to US\$31.343 billion in 2021 from US\$17.519 billion in 2020. The most significant factors impacting our results in 2021 were: (i) higher ferrous minerals realized prices (with an impact of US\$11.923 billion on our net operating revenue), mainly due to the increase in the average realized price for iron ore in 2021 (a 30.8% increase compared to the average realized price in 2020); higher iron ore volumes (with an impact of US\$1.652 billion); higher base metals realized prices (with an impact of US\$1.116 billion); and (ii) higher financial results, which increased to a gain of US\$3,119 million in 2021 from a loss of US\$4,813 million in 2020. These factors were partially offset by additional provisions of US\$1,725 million for dam de-characterization and US\$1,699 million for Fundação Renova.

Adjusted EBITDA is a non-GAAP measure, which is calculated using net income or loss and adding (i) depreciation, depletion and amortization, (ii) income taxes, (iii) financial results, net, (iv) equity results and other results in associates and joint ventures, (v) impairment and disposal of non-current assets, and (vi) dividends received and interest from associates and joint ventures. For more information and the reconciliation of our Adjusted EBITDA to our net income (loss), see *Operating and Financial Review and Prospects—Results of operations—Results of operations by segment—Adjusted EBITDA*.

MAJOR FACTORS AFFECTING PRICES

Iron ore and iron ore pellets

Iron ore and iron ore pellets are priced based on a wide array of quality levels and physical characteristics. Price differences derive from various factors, such as the iron content of specific ore deposits, the beneficiation processes required to produce the desired final product, particle size, moisture content and the type and concentration of contaminants (such as phosphorus, alumina, silica and manganese ore) in the ore. Also, fines, lump ore and pellets typically command different prices.

Demand for our iron ore and iron ore pellets is a function of global demand for carbon steel. Demand for carbon steel, in turn, is strongly influenced by real estate and infrastructure construction and global industrial production. Demand from China has been the principal driver of world demand and prices.

2021 iron ore average price closed at US\$159.49/dmt (Platts IODEX 62% Fe iron ore prices), 46% higher than 2020. In the second quarter of 2021, prices strongly increased following global economy recoveries from the COVID-19 pandemic. The combination of a tighter seaborne market together with a significant upward in steel demand and prices in China, at a time when the country's domestic iron ore production was running at a level close to capacity, feeds through to stronger demand for seaborne iron ore and higher prices. The high coal prices in China, following the country's energy crisis together with high levels of steel margins and the decrease of pellets inventories at Chinese ports supported the level for high grade premiums.

China's crude steel production in 2021 was 1,035Mt, a decrease of 2.8% year-on-year, achieving China Ministry of Industry and Information Technology (MIIT)'s requirement of CSP reduction in 2021 compared to 2020. Crude steel production was 86.19 Mt in December 2021, a decrease of 6.8% year-on-year. The economic recovery in the country continued in 2021, with Gross Domestic Product (GDP) growth rate reaching 8.1% year-on-year in 2021 compared to 2020. Industrial production and exports continued outperforming in the fourth quarter of 2021. GDP growth in the last quarter of 2021 reached 4% year-on-year, slowing from 4.9% year-on-year in the third quarter of 2021, as Fixed

Asset Investment (FAI) moderated in the fourth quarter driven by property and infrastructure. Property sales and construction activities slowed sharply in fourth quarter, which was the main factor affecting steel demand.

Excluding China, easing of restrictions with the rollout of vaccines, rebound of economic activity, manufacturing and supply chain improvements in 2021 contributed to an increase in steel production of 879.1Mt in 2021, up 12.1% year-on-year. Steel production increased in all major producing regions, with a full recovery to pre-pandemic levels in Brazil and European Union (EU28, followed by Japan and North America slightly below pre-pandemic levels. In comparison to 2020, steel production increased 16.6% in the North America, 10.6% in JKT (Japan, Korea and Taiwan), and 14.8% in the EU28, as per the World Steel Association. However, in the last quarter of 2021, production slowed down in Brazil and Europe, driven by slower economic activity due to high inflation and the spread of Omicron.

The price differentials between high- and low-grade iron ores are a structural change that should continue to impact the market in the coming years. The move towards a more efficient steel industry, with the enforcement of stricter environmental policies in China and decarbonization pursuit in Europe, should support the demand for high-quality ores that enable productivity and lower emission levels like pellets and Carajás fines (IOCJ).

We believe that iron ore prices may be subject to additional volatility in 2022 due to the continued impact of the COVID-19 pandemic over the supply chain and increasing geopolitical instability globally.

Nickel

Nickel is an exchange-traded metal, listed on the LME and, starting in 2015, on the SHFE. Most nickel products are priced based on a discount or premium to the LME price, depending mainly on the nickel product's physical and technical characteristics. Demand for nickel is strongly affected by stainless steel production, which represents 69% of global primary nickel consumption in 2021.

We have short-term fixed-volume contracts with customers for the majority of our expected annual nickel sales, which vary in term. These contracts provide stable demand for a significant portion of our annual production. In 2021, 80% of our refined nickel sales were made for non-stainless steel applications (alloy steels, high nickel alloys, plating and batteries), compared to the industry average for nickel producers of 31%, bringing more stability to our sales volumes. As a result of our focus on such higher-value segments, our average realized nickel prices for refined nickel have typically exceeded LME cash nickel prices.

Stainless steel is a significant driver of demand for nickel, particularly in China. In 2021, stainless steel production in China represented 40% of total nickel demand. Therefore, changes in Chinese stainless-steel production have a large impact on global nickel demand. In 2021, Chinese stainless-steel production grew 8% year-on-year compared to 11% in 2020. Also, the growth in stainless steel focused on 300-series grade steels, which contains relatively high amounts of nickel, due to superior physical characteristics compared to other austenitic stainless-steel series.

While stainless steel production is a major driver of global nickel demand, stainless steel producers can obtain nickel with a wide range of nickel content, including secondary nickel (scrap). The choice between primary and secondary nickel is largely based on their relative prices and availability. On average between 2017 and 2021, secondary nickel accounted for approximately 38% of total nickel used for stainless steel. Regional availability and consumption of secondary nickel varies. In China, due to low availability of scrap, the use of secondary nickel represents 27% of the total nickel used for stainless steel in 2021.

In recent years, Chinese domestic production of nickel pig iron accounted for the majority of world nickel supply growth. In 2021, approximately 414kt, representing 15% of world primary nickel supply was produced as nickel pig iron in China using unprocessed nickel ore from the Philippines and Indonesia. Chinese nickel pig iron production was adversely affected by export restriction of unprocessed ores from Indonesia, beginning in 2014. In January 2017, the Indonesian government issued a ministerial decree changing the 2009 mining law that banned the export of unprocessed and semi-processed ores from the country. The ministerial decree allows for the controlled recommencement of limited nickel ore exports from Indonesia allowing availability of ores to produce nickel pig iron in China, with the expectation

of re-enforcing the export ban in 2022. As a result, the bottleneck for production has shifted away from ore availability to nickel pig iron capacity. In 2019, the Indonesian government advanced the export ore ban from the beginning of 2022 to the beginning of 2020. These dynamics have allowed Indonesia to emerge as a large producer of nickel pig iron. In 2021, 886kt of nickel as nickel pig iron was produced in Indonesia much of it integrated directly to produce stainless steel. In 2021, Indonesia commenced converting nickel pig iron into nickel matte for further conversion into battery-suitable material. We expect nickel pig iron production in Indonesia to continue to grow, while China's nickel pig iron production to continue to be impacted by the Indonesian ore export ban advancement.

In addition, the high-value segment, which consists of both Upper Class and Lower Class I products, is the second largest market, making up 31% of nickel demand in 2021. Global high-value demand increased by 22% year-on-year in 2021 led by growth in the battery sector compared to a decline of 9% in 2020.

The nickel market was in deficit in 2021 by approximately 41kt. Global exchange inventories (London Metals Exchange and Shanghai Future Exchange) decreased 158 kt from December 31, 2020 to December 31, 2021, implying a deficit market. For 2022, we expect the market to remain in a slight deficit as demand from stainless steel and batteries remains robust.

The battery segment is showing important upside demand as electric vehicle production continues to attract significant investments. This is positively affecting the nickel price and our nickel premiums. Commercially viable electric vehicle battery technologies utilize nickel; increasing nickel content in such batteries results in improved energy density and lower cost. As a result, nickel demand is growing, particularly given the expected increase in production of electric vehicles and the trends towards increased battery size and increased nickel content in batteries to improve performance and lower cost.

Copper

Copper demand in recent years has been driven primarily by China, given the important role copper plays in construction in addition to electrical and consumer applications. Copper prices are determined on the basis of (i) prices of copper metal on terminal markets, such as the LME, SHFE and the Commodities Exchange ("COMEX"), and (ii) in the case of intermediate products, such as copper concentrate (which comprise most of our sales) and copper anode, treatment and refining charges negotiated with each customer.

Demand for refined copper increased 4% year-on-year in 2021, with China responsible for approximately 52% of worldwide consumption. For 2022, the market is expected to be relatively balanced on stable supply and recovered demand.

TAILINGS DAM RUPTURE IN BRUMADINHO

Tailings Dam Rupture In Brumadinho

The Brumadinho dam rupture had a significant impact on our financial performance and results of operations as of and for the year ended December 31, 2021. The key impacts are summarized below:

Impact on our statement of income. The impact of the dam rupture in our income statement for the year ended December 31, 2021 was US\$851 million, including US\$650 million in expenses, such as communication services, accommodation and humanitarian assistance, equipment for rescue and remediation efforts, legal services, water, food aid among other items.

Impact on our balance sheet. The total amount of provisions recognized in our balance sheet as of December 31, 2021 in connection with Brumadinho dam failure, including provisions for remediation and reparation obligations under the Integral Reparation Agreement, individual indemnification and other commitments is US\$3.537 billion.

Dam de-characterization

As a result of the Brumadinho dam rupture, we required to de-characterize all tailings dams built under the upstream method, certain structures called “line center” and dikes containment facilities located in Brazil. The main impacts on our financial statements are summarized below:

Impact on our income statement. In 2021, we recorded supplemental provisions of US\$1.725 billion due to advances in engineering and geotechnical studies to ensure safety in the execution of the de-characterization of our structures, resulting in the increase on the volume of tailings to be removed from certain structures, changes in containment plans and reinforcement of structures, and the use of remotely controlled equipment instead of conventional equipment.

The engineering projects for these structures are in different stages of maturity, some of them still in the conceptual engineering phase, for which the estimation of expenditures includes in its methodology a high degree of uncertainty in the definition of the total cost of the project in accordance with best market practices.

Impact on our balance sheet. The total amount of provisions recognized in our balance sheet as of December 31, 2021 in relation to the de-characterization of dams is US\$3.523 billion.

Operational stoppages. We have suspended some operations due to judicial decisions or technical analysis performed by us on our upstream dam structures. We recorded losses in relation to the operational stoppage and idle capacity of the ferrous mineral segment in the amounts of US\$376 million for the year ended December 31, 2021. We are working on legal and technical measures to resume all operations at full capacity

Fundação Renova and Samarco Funding

We own a 50% interest in Samarco and account for it under the equity method. Under the March 2016 Framework Agreement, the June 2018 Agreement and Renova’s bylaws, Fundação Renova must be funded by Samarco, but to the extent that Samarco is unable to fund, Vale and BHPB must ratably bear the funding requirements under the Framework Agreement.

In order to implement the projects approved under the Framework Agreement, Samarco will be required to provide funding to Fundação Renova based on the amounts required for such projects on an yearly basis, subject to an annual minimum of US\$145 million. In case Samarco is unable to fund Fundação Renova, totally or partially, Vale and BHP will be required to provide the funding requirements.

Additionally, Fundação Renova must allocate a minimum annual amount of US\$45 million over 15 years (from 2016) to the implementation of compensation programs. Under the Framework Agreement, Fundação Renova must spend an additional amount of at least US\$90 million on sewage collection and treatment and solid waste disposal.

Below is a summary of the impact of the rupture of Samarco’s dam, which occurred in November 2015, in our financial statements:

- The carrying value for our investment in Samarco was reduced to zero in 2015.
- The amount of provisions related to Samarco as of December 31, 2021 is US\$3.112 billion, 50.0% higher than in 2020, mainly due to the new court decisions issued at the end of the fiscal year related to individual indemnities, impacting the provision related to Fundação Renova, as these decisions changed and expanded the types, the categories and the amount of indemnifiable damages to the affected municipalities. This provision represents the present value of our best estimate of the amounts we may incur to comply with our obligations under the Framework Agreement, considering our 50% stake in Samarco. At each reporting period, we reassess the key assumptions used by Samarco in the preparation of its projected future cash flows and adjust the provision, if required.

- In 2021, we contributed US\$413 million, which was allocated as follows: (i) US\$392 million was contributed to Fundação Renova and Samarco to be used in the reparation programs in accordance with the Framework Agreement, and deducted from the provision, and (ii) US\$21 million was used by Samarco to fund its working capital. These contributions were made through the issuance by Samarco of non-convertible private debentures, which were equally subscribed by Vale and BHPB. We recognized an impairment in our statement of income for the year ended December 31, 2021 for the amount of these non-convertible private debentures.
- In addition, ongoing discussions in the context of the Judicial Reorganization of Samarco may lead to the loss of the deductibility of part of the expenses we incurred with the Fundação Renova and of the deferred taxes over the total provision, depending on the method determined for restructuring Samarco's debts. The total exposure as of December 31, 2021 is US\$1.519 billion.

Since the creation of Fundação Renova in 2016 until December 31, 2021, Samarco, BHPB and we made contributions directly to Fundação Renova in the total aggregate amount of US\$4.5 billion.

COVID-19

The COVID-19 pandemic is having a significant impact on the global economy and financial markets.

We have pledged US\$44 million to support humanitarian aid programs in the communities where we operate, with special focus on Brazilian communities that have been more adversely affected by the pandemic. This amount was used to purchase medical supplies and equipment and were recognized as "Other operating expenses" in the income statement for the year ended December 31, 2021, compared to US\$109 million in the income statement for the year ended December 31, 2020.

We continue to monitor the impacts of the pandemic, including the effects on economic activity and on our financial statements. Despite several challenges imposed by the COVID-19 pandemic, the effects of the pandemic have not significantly impacted the fair value of our assets and liabilities to date. However, if the pandemic continues or increases in intensity in the regions where we operate, the financial condition or results of operations could still be negatively impacted.

For more information on the risks related to the COVID-19 pandemic and our response see *Overview—Business overview—Significant changes in our business—Developments related to the pandemic of the coronavirus* and *Overview—Risk factors—Developments relating to the pandemic of the coronavirus may have a material adverse impact on our financial conditions or results of operations*.

EFFECT OF CURRENCY EXCHANGE VARIATION

Our results are affected in several ways by changes in the value of the Brazilian *real*. Year-end exchange rate variations impact our financial results, while the average exchange rate impacts our operational performance.

In 2021, the Brazilian *real* depreciated 7.4% against the U.S. dollar, from an exchange rate of R\$5.20 to US\$1.00 on December 31, 2020 to R\$5.58 to US\$1.00 on December 31, 2021. The most important effects were non-cash losses, as described below.

We had *real*-denominated debt of US\$754 million as of December 31, 2021, excluding accrued charges. Since most of our revenues are in U.S. dollars, we used swaps to convert part of our debt service from Brazilian *reals* to U.S. dollars. Changes in the value of the U.S. dollar against the Brazilian *real* result in fair value variation on these derivatives, affecting our financial results. As a result of the depreciation of the Brazilian *real* against the U.S. dollar in 2021, we had fair value loss on our currency derivatives of US\$159 million. For more information on our use of derivatives, see *Operating and Financial Review and Prospects—Risk management*.

In 2021, the annual average exchange rate for Brazilian *reals* against the U.S. dollar depreciated by 4.6%, from an average exchange rate of R\$5.16 to US\$1.00 in 2020 to R\$5.40 to US\$1.00 in 2021. This had a positive impact on our operational result and cash flows. The most important effect is described below:

Most of our revenues are denominated in U.S. dollars, while our cost of goods sold are denominated in various currencies, including the U.S. dollar (53.0% in 2021), the Brazilian *real* (40.8% in 2021), the Canadian dollar (5.9% in 2021) and other currencies (0.3% in 2021). As a result, the depreciation of the Brazilian *real* and other currencies against the U.S. dollar decreased our costs and expenses by US\$262 million.

Under our hedge accounting program, our debt denominated in U.S. dollars serves as a hedge instrument for our investments in Vale International, a trading company located in Switzerland that sells products in the international market. With the program, the impact of exchange rate variations on debt denominated in U.S. dollars has been partially recorded under other comprehensive income, reducing the volatility of our financial performance. In 2021, we recognized a loss of US\$118 million in the “Cumulative translation adjustments” in stockholders’ equity.

Additionally, we have considered certain long-term intercompany loans payable by Vale S.A. to Vale International. The foreign exchange differences associated with our net investment in Vale International are recognized in other comprehensive income in our stockholders’ equity as “Cumulative translation adjustments”.

In 2021, we recognized a gain of US\$2.413 billion due to the reclassification of portion of the Cumulative translation adjustments to net income due to the capital reduction we approved in Vale International, which was characterized as a partial disposal following our accounting policy for transactions of this nature, as described in “Changes in Accounting Policies.”

CHANGES IN ACCOUNTING POLICIES

Certain new accounting policies were adopted and have impacted our financial statements as of and for the year ended December 31, 2021. The new accounting policies are described below:

- IAS 21 – “Effects of changes in exchange rates and conversion of financial statements” provides that exchange differences arising from transactions and balances of foreign operations are recognized and accumulated in equity until the operations are fully or partially disposed.

“Partial disposal” of an investment can be interpreted as (i) reduction in the percentage of equity interest; or (ii) reduction in the absolute value of the investment through the reduction of the investee’s capital, even if the investor’s percentage of ownership interest is not changed. Therefore, there is an accounting policy choice regarding the definition of partial disposal and, consequently, for the reclassification of cumulative translation adjustments in this context. Following our first capital return from Vale International we made in 2021, we concluded that capital reductions in foreign operations are better reflected in our financial statements through the application of the absolute value approach, which led us to adopt a new accounting policy resulting in the recognition of a gain of US\$2.413 billion in 2021. For more information, see note 2 to our consolidated financial statements.

- IFRS 2 – “Share-based payment” defines the accounting treatment depending on the manner of settlement of the long-term incentive programs, which can be “cash-settled” or “equity-settled”. These programs were recorded as liabilities mainly due to the requirements of the programs to settle our obligation with cash instead of granting shares to our executives. In 2021, we started to treat these programs as equity-settled due to changes in the legal form of the programs allowing the settlement with shares. The effects of this change were not material and are detailed in note 29 to our financial statements.

RESULTS OF OPERATIONS

For commentary on our results of operations for the year 2020 compared with 2019, please see pages 103-113 of our Form 20-F for the year ended December 31, 2020. In our Form 20-F for the year ended December 31, 2020, our coal operations were not classified as discontinued operations, but the reclassification of coal operations as discontinued operations would not have a material impact on the discussion of our results of operations for the year 2020 compared with 2019 contained therein. See note 16 to our consolidated financial statements for additional information on our net income from discontinued operations for the years ended 2021, 2020 and 2019.

Consolidated statement of income data

	For the year ended December 31,		
	2021	2020	% change
	<i>(US\$ million)</i>		
Net operating revenue	54,502	39,545	37.8
Cost of goods sold and services rendered	(21,729)	(17,564)	23.7
Selling, general, administrative and other operating expenses, net	(881)	(1,291)	(31.8)
Research and evaluation expenses	(549)	(415)	32.3
Pre-operating and operational stoppage	(648)	(887)	(26.9)
Brumadinho event and de-characterization of dams	(2,576)	(5,257)	(51.0)
Impairment and disposals of non-current assets	(426)	(1,308)	(67.4)
Operating income	27,693	12,823	116.0
Non-operating income (expenses):			
Financial income (expenses), net	3,119	(4,813)	(164.8)
Equity results and other results in associates and joint ventures	(1,271)	(1,020)	24.6
Income before income taxes	29,541	6,990	322.6
Income taxes	(4,697)	(735)	539.0
Net income from continuing operations	24,844	6,255	297.2
Net income (loss) attributable to non-controlling interests	108	(3)	(3,700.0)
Net income from continuing operations attributable to Vale's stockholders	24,736	6,258	295.3
Loss from discontinued operations attributable to Vale's stockholders	(2,291)	(1,377)	66.4
Net income	22,468	4,531	395.9
Net income (loss) attributable to non-controlling interests	23	(350)	(106.6)
Net income attributable to Vale's stockholders	22,445	4,881	359.8

CONSOLIDATED REVENUES

In 2021, our net operating revenues from continuing operations increased by US\$14.957 billion or 37.8% to US\$54.502 billion, from US\$39.545 billion in 2020. The increase was mainly due to (i) higher ferrous minerals prices driven by iron ore realized prices reflecting the increase in the market reference price (impact of US\$9.051 billion), and (ii) higher iron ore sales volume (impact of US\$1.652 billion).

Our revenue depends, among other factors, on the volume of production at our facilities and the prices for our products. For more information on our production, see *Information on the Company—Lines of business*. Increases in the capacity of our facilities resulting from our capital expenditure program have an important effect on our performance. Our production is also affected by acquisitions and dispositions.

The following table summarizes, for each of the years indicated, the distribution of our net operating revenues based on the geographical location of our customers.

	Net operating revenues by destination			
	2021		2020	
	(US\$ million)	(% of total)	(US\$ million)	(% of total)
<i>North America</i>				
Canada	367	0.7	262	0.7
United States	1,543	2.8	1,041	2.6
North America - total	1,910	3.5	1,303	3.3
<i>South and Central America</i>				
Brazil	5,164	9.5	2,897	7.3
Other	916	1.7	498	1.3
South and Central America - total	6,080	11.2	3,395	8.6
<i>Asia</i>				
China	28,603	52.5	23,124	58.5
Japan	4,523	8.3	2,193	5.5
South Korea	1,744	3.2	1,196	3.0
Taiwan	999	1.8	587	1.5
Other	1,758	3.2	1,216	3.1
Asia – total	37,627	69.0	28,316	71.6
<i>Europe</i>				
Germany	2,034	3.7	1,526	3.9
England	116	0.2	581	1.5
Italy	652	1.2	275	0.7
France	583	1.1	263	0.7
Other	3,345	6.1	2,451	6.2
Europe – total	6,730	12.3	5,096	12.9
Rest of the world	2,155	4.0	1,435	3.6
Total	54,502	100%	39,545	100%

CONSOLIDATED OPERATING COSTS AND EXPENSES

Our cost of goods sold and services rendered from continuing operations increased by US\$4.165 billion, or 23.7%, to US\$21.729 billion in 2021 from US\$17.564 billion in 2020. Excluding depreciation, depletion and amortization, our cost of goods sold and services rendered increased by US\$4.269 billion, reflecting (i) higher sales volumes (impact of US\$758 million) and (ii) higher costs on the ferrous minerals segment (impact of US\$3.408 billion), mainly due to higher volumes and prices of third-party acquisition of iron ore fines, royalties and freight.

Our selling and administrative expenses from continuing operations were US\$481 million in 2021, in line with US\$491 million recorded in 2020.

Our research and evaluation expenses totaled US\$549 million in 2021, a 32.3% increase from US\$415 million recorded in 2020, mainly due to projects of drilling and geology exploration and mineral exploration in all segments.

Our pre-operating and operational stoppage expenses totaled US\$648 million in 2021, a decrease of US\$239 million from the US\$887 million recorded in 2020, due to lower idle capacity in the stopped operations related to the Brumadinho dam rupture.

Our other operating expenses, net, were US\$400 million in 2021, a US\$400 decrease from US\$800 million recorded in 2020, mostly due to lower expenses with obligations for the decommissioning of assets. In 2021, we recognized

expenses of US\$121 million related to the decommissioning of the water structure of the base metals operations in Canada, while in 2020, we recognized expenses of US\$312 million mainly related to the decommissioning of base metal structures in Canada and iron ore in Brazil.

Expenses associated with the rupture of the Brumadinho dam and de-characterization of dams were US\$2.576 billion in 2021, compared to US\$5.257 billion in 2020. These expenses consisted of obligations assumed, including de-characterization of the dams, indemnification and donations to those affected by the event, remediation of the affected areas and compensation to affected communities.

RESULTS OF OPERATIONS BY SEGMENT

Net operating revenue by segment

The following table summarizes our net operating revenues by product for the years indicated.

	Year ended December 31,		
	2021	2020	% change
	<i>(US\$ million, except for %)</i>		
Ferrous minerals:			
Iron ore	38,701	27,285	41.8
Iron ore pellets	7,053	4,242	66.3
Ferrous alloys and manganese	175	225	(22.2)
Other ferrous products and services	373	326	14.4
Ferrous minerals - total	46,302	32,078	44.3
Base metals:			
Nickel and other products ⁽¹⁾	5,377	4,652	15.6
Copper concentrate ⁽²⁾	2,589	2,175	19.0
Base metals - total	7,966	6,827	16.7
Other products and services	234	640	(63.4)
Total from continuing operations	54,502	39,545	37.8
Discontinued operations - Coal	1,083	473	129.0
Net operating revenues	55,585	40,018	38.9

(1) Includes nickel coproducts (copper) and byproducts (precious metals, cobalt and others).

(2) Does not include copper produced in our nickel operations.

Sales volumes

Production and sales of iron ore fines and iron ore pellets decreased mainly as a result of the suspension of operations following the Brumadinho dam rupture and the stronger than usual weather-related seasonality. The following table sets forth our principal products and the total volumes sold of each product in each of the years indicated:

	Year ended December 31,		% change
	2021	2020	
	<i>(thousand metric tons, except where indicated)</i>		
Ferrous minerals:			
Iron ore fines	275,456	254,012	8.4
Iron ore pellets	32,306	31,211	3.5
Manganese	573	1,378	(58.4)
Ferroalloys	58	67	(12.3)
ROM (run of mine)	2,052	853	140.5
Base metals:			
Nickel	182	183	(0.5)
Copper	216	247	(12.6)
Copper as nickel byproduct	68	99	(31.3)
PGMs (000' oz.)	173	325	(46.8)
Gold (000' oz.)	340	441	(22.9)
Silver (000' oz.)	1,399	2,231	(37.3)
Cobalt (metric tons)	2,017	1,739	16.0

Average realized prices

The following table sets forth our average realized prices for our principal products for each of the years indicated. We determine average realized prices based on our net operating revenues, which consist of the price charged to customers, excluding certain items that we deduct in arriving at net operating revenues, mainly value-added tax.

	Year ended December 31,		% change
	2021	2020	
	<i>(US\$ per metric ton, except where indicated)</i>		
Ferrous minerals:			
Iron ore	140.50	107.42	30.8
Iron ore pellets	218.34	135.90	60.7
Manganese	139.25	114.85	21.2
Ferroalloys	1,626.1	947.97	71.5
Base metals:			
Nickel	18,004.45	15,976.44	12.7
Copper	9,337.08	5,864.18	59.2
Copper as nickel byproduct	9,237.07	5,864.83	57.5
Gold (US\$/oz)	1,768.35	1,857.35	4.8
Silver (US\$/oz)	23.87	21.06	13.3
Cobalt	51,906.63	43,130.91	20.1

Cost of goods sold by segment (excluding depreciation, depletion and amortization)

The following table presents, for each year indicated, our cost of goods sold and services rendered (excluding depreciation, depletion and amortization) by segment and the percentage change from year to year.

	Year ended December 31,		% change
	2021	2020	
	<i>(US\$ million, except for %)</i>		
Ferrous minerals:			
Iron ore	11,468	8,171	40.4
Iron ore pellets	2,231	1,661	34.3
Ferrous alloys and manganese	119	179	(33.5)
Other ferrous products and services	281	254	10.6
Ferrous minerals – total	14,099	10,265	37.4
Base metals:			
Nickel and other products (1)	3,606	2,734	31.9
Copper (2)	878	794	10.6
Base metals – total	4,484	3,528	27.1
Others	289	810	(64.3)
Total of continuing operations (excluding depreciation, depletion and amortization)	18,872	14,603	29.2
Depreciation, depletion and amortization	2,857	2,961	(3.5)
Total of continuing operations (including depreciation, depletion and amortization)	21,729	17,564	23.7

(1) Includes nickel coproducts (copper) and byproducts (precious metals, cobalt and others).

(2) Does not include copper produced in our nickel operations.

Expenses by segment (excluding depreciation, depletion and amortization)

The following table summarizes, for each year indicated, our expenses (consisting of selling, general and administrative, research and evaluation, pre-operating, stoppage and other expenses, net of other revenues) by operating segment (excluding depreciation, depletion and amortization) and the percentage change from year to year.

	Year ended December 31,		% change
	2021	2020	
	<i>(US\$ million, except for %)</i>		
Ferrous minerals:			
Iron ore	663	848	(21.8)
Iron ore pellets	20	71	(71.8)
Ferrous alloys and manganese	17	31	(45.2)
Other ferrous products and services	(5)	(1)	400.0
Ferrous minerals – total	695	949	(26.8)
Base metals:			
Nickel and other products (1)	195	92	112.0
Copper (2)	94	76	23.7
Base metals – total	289	168	72.0
Brumadinho event and de-characterization of dams (3)	2,576	5,257	(51.0)
COVID-19	44	109	(59.6)
Others	873	1,113	(21.6)
Total from continuing operations (excluding	4,477	7,596	(41.1)

	Year ended December 31,		% change
	2021	2020	
	(US\$ million, except for %)		
depreciation, depletion and amortization)			
Depreciation, depletion and amortization	177	254	(30.3)
Total from continuing operations (including depreciation, depletion and amortization)	4,654	7,850	(40.7)

- (1) Includes nickel coproducts (copper) and byproducts (precious metals, cobalt and others).
- (2) Does not include copper produced in our nickel operations.
- (3) In 2019, following the rupture of the Brumadinho dam, we created a special department in charge of reparation and development (*Diretoria Especial de Reparação e Desenvolvimento*), which is in charge of social, humanitarian, environmental and structural recovery measures in Brumadinho and other affected areas. This special department, which reports to our CEO, assesses the costs related to the Brumadinho event. These costs are not allocated to any operating segment because they are not directly related to any of our operating activities.

Adjusted EBITDA by segment

The following table summarizes our Adjusted EBITDA for each of our segments.

	Year ended December 31,	
	2021	2020
	Adjusted EBITDA	Adjusted EBITDA
	(US\$ million)	
Ferrous minerals:		
Iron ore	26,580	18,289
Iron ore pellets	4,873	2,626
Ferroalloys and manganese	39	15
Other ferrous products and services	97	75
Ferrous Minerals – total	31,589	21,005
Base metals:		
Nickel and other products (1)	1,576	1,826
Copper (2)	1,617	1,305
Base Metals – total	3,193	3,131
Brumadinho Event and de-characterization of dams (3)	(2,576)	(5,257)
COVID-19	(44)	(109)
Other (4)	(819)	(1,251)
Adjusted EBITDA from continuing operations	31,343	17,519
Adjusted EBITDA from discontinued operations (coal)	(189)	(931)
Adjusted EBITDA	31,154	16,588

- (1) Includes nickel coproducts (copper) and byproducts (precious metals, cobalt and others).
- (2) Does not include copper produced in our nickel operations.
- (3) In 2019, following the rupture of the Brumadinho dam, we created the Special Recovery and Development Board, which is in charge of social, humanitarian, environmental and structural recovery measures in Brumadinho and other affected areas. This board, which reports to the CEO, assesses the costs related to the Brumadinho event. These costs are not allocated to any operating segment because they are not directly related to any of our operating activities.
- (4) The line "Others" includes sales and expenses of other products, services, research and development, investments in joint ventures and associates of other business and unallocated corporate expenses.

The table below shows a reconciliation of our Adjusted EBITDA with our net income (loss) for the years indicated. Our management uses Adjusted EBITDA as the measure to assess the contribution of each segment to our performance and to support decision-making in allocating resources. Adjusted EBITDA is a non-GAAP measure, which is calculated for each segment using operating income or loss from continuing operations plus dividends received and interest from associates and joint ventures and adding back the amounts charged as (i) depreciation, depletion and amortization and (ii) impairment and disposal of non-current assets. For more information, see note 4 to our consolidated financial statements.

	<i>Year ended December 31,</i>	
	2021	2020
	<i>(US\$ million)</i>	
Net Income from continuing operations attributable to Vale's stockholders	24,736	6,258
Net Income (loss) attributable to non-controlling interests	108	(3)
Net Income	24,844	6,255
Depreciation, depletion and amortization	3,034	3,215
Income taxes	4,697	735
Financial results, net	(3,119)	4,813
Equity results and other results in associates and joint ventures	1,271	1,020
Dividends received from associates and joint ventures	190	173
Impairment and disposal of non-current assets	426	1,308
Adjusted EBITDA from continuing operations	31,343	17,519
Adjusted EBITDA from discontinued operations (coal)	(189)	(931)
Adjusted EBITDA	31,154	16,588

We discuss below, for each segment, the changes in our net operating revenues, cost of goods sold and services rendered (excluding depreciation, depletion and amortization), expenses (excluding depreciation, depletion and amortization and excluding impairment charges) and Adjusted EBITDA. The expenses incurred in connection with remediation, indemnification and donations in respect of the rupture of the Brumadinho dam are not directly related to our operating activities and are therefore not allocated to any operating segment.

Ferrous minerals

Our net operating revenues from sales of ferrous minerals totaled US\$46.302 billion in 2021, a 44.3% increase from US\$32.078 billion in 2020, mainly reflecting higher volumes and average realized sales prices of iron ore fines and iron ore pellets. Our average realized prices for iron ore fines in 2021 were 30.8% higher than our average realized prices in 2020 (impact of US\$9.051 billion). Our sales volume of iron ore fines increased by 8.4% in 2021, compared to 2020 (impact of US\$2.365 billion). Our sales volume of iron ore pellets increased by 3.5%, compared to 2020, (impact of US\$14 million).

Our cost of goods sold and services rendered from ferrous minerals, excluding depreciation, depletion and amortization, increased by 37.4% in 2021, to US\$14.099 billion in 2021 from US\$10.265 billion in 2020. This increase primarily reflects higher costs with (i) royalties and third-party acquisition of iron ore due to the 46.5% increase in the reference price (impact of US\$1.102 billion), (ii) freight costs, mainly due to the 31.2% increase in bunker (impact of US\$900 million), (iii) expenses with services rendered and materials (impact of US\$462 million), (iv) maintenance costs, due to the implementation of improvements aiming recovery of volumes from ferrous mineral operations (impact of US\$326 million) and (v) sales volumes (impact of US\$658 million). Our cost of goods sold and services rendered from ferrous minerals in 2021 was positively affected by exchange rate variation (impact of US\$232 million).

Our net expenses from ferrous minerals, excluding depreciation, depletion and amortization, decreased by 26.8%, to US\$695 million in 2021, compared to US\$949 million in 2020, mainly due to lower stoppage expenses following the decrease in the idle capacity of our operations in Minas Centrais, Mariana, Paraopeba and Vargem Grande complexes.

Our Adjusted EBITDA from ferrous minerals was US\$31.589 billion in 2021, an increase of US\$10.584 billion, or 50.4% compared to our Adjusted EBITDA in 2020. This increase primarily reflects higher average realized sales prices of iron ore fines.

Base metals

Our net operating revenues from sales of base metals totaled US\$7.966 billion in 2021, a 17% increase from US\$6.827 billion in 2020. The increase was mainly driven by higher sales prices for nickel and copper (impact of US\$1.116 billion) following the increase of 34% and 51%, respectively, on the LME prices. Our nickel and copper sales volume of nickel decreased by 1kt and 31kt respectively, when compared to 2020, with an impact of US\$200 million.

Our cost of goods sold from base metals, excluding depreciation, amortization and depletion, increased by 27% in 2021, to US\$4.484 billion in 2021 from US\$3.528 billion in 2020, mainly due to increased volume of third-party acquisition of copper and nickel (impact of US\$859 million). Our cost of goods sold and services rendered from base metals in 2021 was negatively affected by exchange variation (impact of US\$94 million).

Our net expenses from base metals, excluding depreciation, amortization and depletion, increased US\$121 million in 2021, to US\$289 million in 2021 from US\$168 million in 2020, mainly due to the idle capacity from the strike in Sudbury (impact of US\$117 million).

Our Adjusted EBITDA from base metals was US\$3.193 billion in 2021, in line with US\$3.131 billion recorded in 2020.

FINANCIAL RESULTS, NET

The following table details our financial results, net, for the years indicated.

	Year ended December 31,	
	2021	2020
	<i>(US\$ million)</i>	
Financial income(1)	337	307
Financial expenses(2)	(1,653)	(3,191)
Losses on derivatives, net	(23)	(1,210)
Net foreign exchange gains (losses)	408	(549)
Reclassification of cumulative translation adjustments	4,326	-
Indexation losses, net	(276)	(170)
Financial results, net	3,119	(4,813)

(1) Includes short-term investments and other financial income (see note 23 to our consolidated financial statements)

(2) Includes loans and borrowings gross interest, capitalized loans and borrowing costs, participative stockholders' debentures, expenses of REFIS, interest on lease liabilities, financial guarantees, expenses with cash tender offer repurchased and others financial expenses (see note 23 to our consolidated financial statements).

In 2021, our financial results, net, was an income of US\$3,119 million compared to an expense of US\$4,813 million in 2020. This mainly resulted from:

Reclassification of cumulative translation adjustments. We recognized gains in the amount of US\$4.326 billion, due to the reclassification of the exchange rate variation recorded in stockholders' equity related to (i) the capital reduction of Vale International (impact of US\$2,413 million), (ii) the liquidation of Vale Shipping Holding, a formerly operational subsidiary in international iron ore logistics (impact of US\$771 million), and (iii) the completion of the sale of VNC (impact of US\$1,132 million).

Net foreign exchange. We recognized a gain of US\$408 million in 2021 compared to net foreign exchange loss of US\$549 million in 2020, mainly due to the following: the Brazilian *real* depreciated by 4.6% against the U.S. dollar in 2021, compared to a 30.6% depreciation of the Brazilian *real* in 2020.

Losses on derivatives of US\$23 million in 2021, compared to US\$1,210 million in 2020. This variation was derived from the following main categories of derivatives transactions:

- **Currency and interest rate swaps.** We recognized a net loss of US\$159 million in 2021 from currency and interest rate swaps, compared to a net loss of US\$1,147 million in 2020. These swaps are primarily used to convert debt denominated in Brazilian Reais into U.S. dollars in order to protect our cash flow from exchange rate volatility. Despite those losses, we recorded an offsetting reduction in the dollar value of its Brazilian Real-denominated debt, which is not recognized in the income statement.
- **Gasoil, Brent and Freight derivatives.** We recognized a net gain of US\$127 million in 2021, compared to a net loss of US\$134 million in 2020. This gain resulted from the fair value of the hedge contracts and the variation is due to volatility in the spot price of bunker oil, brent crude oil and gasoil.
- **Others.** In 2021, we recognized a gain of US\$11 million in the fair value of other derivatives instruments (including lenders' conversion options into our shares of VLI S.A. (VLI)), compared to a gain of US\$61 million in 2020.

The non-cash effect of the fair value changes in participative stockholders' debentures represented a loss of US\$716 million in 2021, compared to a loss of US\$1,565 million in 2020. This variation was derived from the decrease on the weighted average trading price of the secondary market in 2021 compared to 2020.

Financial expenses decreased by US\$1,538 million, to US\$1,653 million in 2021 from US\$3,191 million in 2020, attributable primarily to: US\$780 million of gains with fair value adjustments on financial guarantees given to Companhia Siderúrgica do Pecém, as a result of improvements in the credit ratings of such associate.

EQUITY RESULTS AND OTHER RESULTS IN ASSOCIATES AND JOINT VENTURES

In 2021, the equity results and other results in associates and joint ventures accounted for a loss of US\$1.271 billion compared to a loss of US\$1.020 billion in the same period in 2020. The result is mainly due to the recognition of a provision of US\$1.700 billion to mitigate and compensate the impacts from the rupture of Samarco's Fundão dam, partially offset by a gain of US\$494 million arising from the equity results of others associates and joint ventures.

INCOME TAXES

In 2021, we recorded a net income tax expense of US\$4.697 billion, compared to a net income tax expense of US\$735 million in 2020. Our effective tax rate differed from our statutory tax rate of 34%, principally due to tax incentives from our iron ore, copper and nickel operations in the North region of Brazil (impact of US\$2,826 million), resulting in an effective tax rate of 16%. The reconciliation from statutory tax rate to our effective tax rate is presented in note 8 to our consolidated financial statements.

NET INCOME FROM CONTINUING OPERATIONS

For the reasons discussed above, our net income from continuing operations in 2021 was US\$24.844 billion, compared to US\$6.255 billion in 2020.

LOSS FROM DISCONTINUED OPERATIONS

In 2020, as part of the sustainable mining strategic agenda, we announced our intention to divest from coal assets. In order to achieve this objective, we carried out a corporate reorganization through the acquisition of the interests held by Mitsui in these assets, which, upon completion, allowed us to reach an agreement with Vulcan in December 2021, for the sale of all of our coal assets.

In 2021, we had a loss from discontinued operations attributable to Vale's stockholders of US\$2.291 billion compared to a loss of US\$1.377 billion in 2020. For more information on our discontinued operations, see note 16 to our consolidated financial statements. For more information on the sale of our coal business, see *Overview—Business Overview—Significant Changes in Our Business—Divestments* and *Information on the company—Discontinued Operations*, and note 16 to our consolidated financial statements.

LIQUIDITY AND CAPITAL RESOURCES

Our principal funding requirements are for capital expenditures, dividend, payments, share and buybacks payments, debt service, tax payments, dam de-characterization and satisfaction of our obligations relating to the remediation and compensation of damages in connection with the Brumadinho dam failure and any contribution we may be required to make to Fundação Renova, pursuant to the Framework Agreement. We expect to meet these requirements, in line with our historical practice, by using cash generated from operating activities and borrowings.

Our investment guidance for capital expenditures in 2022 is approximately US\$5.8 billion. A principal amount of US\$872 million of our debt matures in 2022. We expect to incur a total amount of US\$3.5 billion relating to the remediation and compensation in connection with the Brumadinho dam failure, de-characterization of dams and contributions to Fundação Renova in 2022. After 2022, (i) our average estimated capital expenditures ranges between US\$5.0 billion and US\$6.0 billion per year and (ii) our aggregate expected expenses associated with reparation and compensation relating to Brumadinho dam failure and de-characterization of dams is US\$7.0 billion. We have an aggregate principal amount of US\$2.438 billion debt maturing between 2023 and 2025, and US\$8.712 billion maturing after 2025. We expect that our operating cash flows and borrowings will be sufficient to satisfy our obligations due in 2022 and thereafter. We are constantly evaluating opportunities for additional cash generation. Finally, we are committed to continue the reduction in our costs and expenses, maintain our debt leverage and discipline in capital allocation.

SOURCES OF FUNDS

Our principal sources of funds are our operating cash flow and borrowings. The amount of operating cash flow is strongly affected by global prices for our products. In 2021, cash flow from our operating activities amounted to US\$25,679 million, compared to US\$14,322 million in 2020. In 2021, our cash, cash equivalents and short-term investments totalled US\$11,905 million compared to US\$14,258 million in 2020.

In 2021, we borrowed US\$930 million, compared to US\$6,800 million in 2020, including US\$350 million in pre-export financing agreements with commercial banks and US\$580 million in loan agreements with development banks and agencies.

USES OF FUNDS

In the ordinary course of business, our principal funding requirements are for capital expenditures, dividend payments, share buybacks, debt service, tax payments, dam de-characterization, and satisfaction of our obligations relating to the remediation and compensation of damages in connection with the Brumadinho dam failure and any contribution we may be required to make to Fundação Renova, pursuant to the Framework Agreement. In addition, in 2021, we used a total amount of cash of US\$1,898 million in matters related to the rupture of our dam in Brumadinho, of which US\$1,056 million in connection with obligations assumed under settlement agreements, US\$192 million in individual indemnification and other commitments and US\$650 million was in connection with communication services, accommodation and humanitarian assistance, equipment, legal services, water, food aid, taxes, among others. In 2021, we also used a total amount of cash of US\$392 million in matters related to the de-characterization of dams.

In 2021, we also used a total amount of cash of US\$413 million, in matters related to the rupture of Samarco's dam, of which US\$392 million was contributed to Fundação Renova and Samarco to be used in the reparation programs in accordance with the Framework Agreement, and US\$21 million was used by Samarco to fund its working capital.

Capital expenditures

Our capital expenditures in 2021 amounted to US\$5,033 million, including US\$4,034 million dedicated to sustaining our existing operations and US\$999 million for project execution (construction in progress). For more information about the specific projects for which we have budgeted funds, see *Information on the Company—Capital expenditures*.

Distributions and repurchases

Distributions. In 2021, we approved and paid dividends and interest on stockholders' equity in the amount of US\$9,844 million, as follows: (i) US\$2,200 million, as approved by the Board of Directors on June 17, 2021; and (ii) US\$7,644 million, approved by the Board of Directors on September 16, 2021. Of the total amount paid, US\$1,476 million was based on profit reserves and the remaining amount on the anticipation of the income for the year ended December 31, 2021.

On February 24, 2022, our Board of Directors approved a dividend payment of R\$17,489 million (approximately US\$3,500 million), paid on March 16, 2022.

Repurchases. On April 1, 2021, our Board of Directors approved a share buyback program limited to a maximum of 270,000,000 shares, and their respective ADRs, representing up to 5.3% of the total number of outstanding shares on that date. This program was concluded in November 2021 with the repurchase of all shares, corresponding to the amount of US\$5,281 million, of which US\$2,273 million by wholly-owned subsidiaries and US\$3,008 directly by Vale S.A.

Following the previous program, the Board of Directors approved on October 28, 2021, a new share buyback program for our stocks limited to a maximum of 200,000,000 stocks, and their respective ADRs, representing up to 4.1% of the total number of outstanding stocks on that date. As of December 31, 2021, we had repurchased 21,184,500 shares, in the amount of US\$264 million, through our wholly-owned subsidiaries.

As of December 31, 2021, we had repurchased 291,184,500 shares at an average price of US\$19.04 per share, 152,166,153 through wholly-owned subsidiaries and 139,018,347 directly by Vale S.A. The total amount acquired was US\$5,546 million, of which US\$2,538 million were acquired through wholly owned subsidiaries and US\$3,008 million by Vale S.A. As of December 31, 2021, our subsidiaries continued to hold the acquired shares.

Tax payments

We paid US\$4,053 million in income tax in 2021, excluding the payments in connection with REFIS tax settlement, compared to US\$1,397 million in 2020. In 2021, we paid a total of US\$332 million in connection with the REFIS, compared to US\$339 million in the same period in 2020.

Liability Management

In 2021, we repaid US\$1,927 million under our financing agreements, including, but not limited to, US\$854 million through a bond redemption consummated in March 2021, and the repayment of US\$435 million in loans with commercial banks, development banks and other institutions.

DEBT

As of December 31, 2021, our total outstanding debt was US\$12,180 million (including US\$12,022 million of principal and US\$158 million of accrued interest) compared with US\$13,360 million as of December 31, 2020. As of December 31, 2021, US\$82 million of our debt was secured by our property, plant and equipment. As of December 31, 2021, the weighted average of the remaining term of our debt was 8.7 years, compared to 8.4 years in 2020.

As of December 31, 2021, the short-term debt and the current portion of long-term debt was US\$1,030 million, including accrued interest.

Our major categories of long-term indebtedness are described below. The principal amounts shown below, excluding accrued interest.

- U.S. dollar-denominated loans and financing (US\$3,136 million as of December 31, 2021). This category includes export financing lines, loans from export credit agencies, and loans from commercial banks and multilateral organizations.

- U.S. dollar-denominated fixed rate notes (US\$7,448 million as of December 31, 2021). We have issued in public offerings several series of fixed-rate debt securities, directly by Vale and through our wholly-owned finance subsidiary Vale Overseas Limited (debt securities guaranteed by Vale) totaling US\$6,631 million. Our subsidiary Vale Canada has outstanding fixed-rate note in the amount of US\$297 million.
- Other debt (US\$566 million as of December 31, 2021). We have outstanding debt, principally owed to BNDES, Brazilian commercial banks and holders of infrastructure debentures, denominated in Brazilian reais and other currencies.

As of December 31, 2021, we have two revolving credit facilities with syndicates of international banks, which will mature in 2024 and 2026. The revolving credit lines, which are committed, allow more efficient cash management, consistent with our strategic focus on reducing cost of capital. We currently have US\$5 billion available under these two revolving credit lines which can be drawn by Vale, Vale Canada and Vale International.

Some of our long-term debt instruments contain financial covenants. In particular, instruments representing 19.7% of the aggregate principal amount of our total debt require that we maintain, as of the end of each quarter, (i) a consolidated ratio of total debt to adjusted EBITDA for the past 12 months not exceeding 4.5 to one and (ii) a consolidated interest coverage ratio of at least 2.0 to one. These covenants appear in our financing agreements with BNDES, with other export and development agencies, and with some other lenders. As of December 31, 2021, we were in compliance with our financial covenants.

As of December 31, 2021, the corporate financial guarantees we provided (within the limit of our direct or indirect interest) for certain associates and joint ventures totaled US\$1,513 million.

In a broader view, the sum of our net debt with other relevant commitments with respect to leases, the REFIS tax settlement, de-characterization and the Brumadinho and Samarco commitments increased from US\$13,334 million as of December 31, 2020 to US\$15,061 million as of December 31, 2021.

RISK MANAGEMENT

We have developed an integrated framework for managing the risks to which we are exposed, in order to support the achievement of our objectives, financial strength and flexibility and business continuity. In 2021, we expanded the use of our global risk management platform to promote synergies among our lines of defense, ensuring greater sharing of knowledge and process simplification. Our risk management strategy considers the impact on our business of market risk factors (market risk), risks associated with inadequate or failed internal processes, people, systems or external events (operational risk), risks arising from third-party obligations (credit risk), risks from exposure to legal penalties, fines or reputational losses associated with failure to act in accordance with applicable laws and regulations, internal policies or best practices (compliance risk), and risks associated with our business model, ESG, and political and regulatory conditions in countries in which we operate (strategic risk), among others.

RISK GOVERNANCE STRUCTURE

Our Board of Directors has established seven advisory committees, two of them, in particular, with major roles in advising the Board on and monitoring our risks: the Audit Committee, which evaluates and monitors the effectiveness and sufficiency of our controls and risk management system, and the Operational Excellence and Risks Committee, which focuses in the operational and geotechnical risks.

Our Board of Executive Officers has established five advisory committees (the Business Risk Executive Committees) to advise our management with respect to each of these risks: (i) operational risks, (ii) geotechnical risks, (iii) strategy, finance and cyber risks, (iv) compliance risks and (v) sustainability and institutional relations and reputational risks. The main responsibilities of these committees are, among others: promoting and spreading the culture of risk management throughout the company; supporting the first line of defense; supporting our management on preventive monitoring of potential operational, geotechnical, strategy, finance, compliance and cyber risks; making preventive recommendations about potential risks; and recommending revisions about management instruments and risk prevention principles, in accordance with the Risk Management Policy.

In 2021, the Audit and Compliance Department, which reports directly to the Board of Directors and is supervised by the Audit Committee, launched the Ethics & Compliance Program. The program is led by Corporate Integrity, and has six main elements: (1) **Governance** to ensure autonomy and independence from others executive structures of the company; (2) **Guidelines** based on the rules detailed in our Code of Conduct, Anti-Corruption normative documents and policies and procedures; (3) **Communication & Training** to guide employees on how to overcome challenging situations and make the best decisions in a responsible and ethical way; (4) **Risks & Monitoring** to guarantee the company's adherence to the Program's guidelines; (5) **Whistleblower Channel** to report cases of suspicion or ethical misconduct; and (6) **Consequence Management** to enable the use of disciplinary measures for confirmed misconduct inside the company.

In 2021, we also revised: (1) our **Global Anti-Corruption Manual**, which sets out the rules and guidelines of the Global Anti-Corruption Policy in a simple and accessible way; (2) our **Conduct and Integrity Committee's Charter** which now establishes the inclusion of an external member; and (3) our **Global Guidelines on Conflicts of Interest** to reinforce the culture of integrity and ensure that business decisions are not influenced by undue personal interests. We also published our first **Consequence Management Policy** to enhance transparency and standardize the process of consequence management globally.

Furthermore, the Audit and Compliance Department reinforced the internal audit activities with the creation of a team focused on technical and operational safety matters and also restructured the functional activities of the Whistleblower Channel.

The Whistleblower Channel is structured to guarantee confidentiality, protect whistleblower anonymity and the information for a fair investigation. The Whistleblower Channel offers all conditions for a report to be independently verified, and prohibits breaches of confidentiality, intimidation or retaliation against whistleblowers.

Any breaches of our Code of Conduct, policies and standards can be reported by anyone, including employees, contractors, suppliers, members of affected communities and other stakeholders, via our Whistleblower Channel.

Our risk governance structure is based on the Risk Management Policy, which has the main purpose of: (i) supporting the strategic planning, budget and sustainability of our business; (ii) strengthening the capital structure and asset management of our business, by including concepts and assumptions of management based on potential risk in operations, maintenance of assets and logistics modes; (iii) strengthening our governance practices, based on lines of defense model; (iv) using ISO 31000, ISO 55000 and COSO-ERM standards as references for risk management; (v) adopting the RBPS (Risk Based Process Safety) as the operational safety management system; (vi) measuring and monitoring our potential risks, on a consolidated basis, considering the effect of diversification, when applicable, of our entire business; (vii) establishing a specialized structure for specific and independent performance, as Second Line of Defense Specialist, in the assessment of potential operational risks, including geotechnical risks; and (viii) assessing the impact of new investments, acquisitions and divestitures on our risk map and risk tolerance.

In March 2021 we revised our Risk Management Norm to update our Risk Tables and Matrices, as well as our Integrated Risk Map. We also reviewed our Risk Management Policy to include concepts of business risks, corporate and operational processes risks and to reinforce the roles and responsibilities of the three lines of defense. Our Risk Management Policy may be accessed at our website.

Our integrated risk governance practice is based on a three lines of defense model. We reevaluate our risk practices from time to time to ensure the alignment between strategic decisions, performance and the risk approach determined by our Board of Directors.

MANAGEMENT OF SPECIFIC RISKS

Market Risk

We are exposed to various market risk factors that can impact our cash flow. An assessment of the potential impact of the consolidated market risk exposure is performed periodically to support the decision making process regarding the risk management strategy, which may incorporate financial instruments, including derivatives. The financial instrument portfolio is monitored on a monthly basis, enabling us to properly evaluate financial results and their impact on cash flow, and ensure correlation between the strategies implemented and the proposed objectives.

Considering the nature of our business and operations, the main market risk factors that we are exposed to are:

Product prices and input costs. We are exposed to market risks associated with commodities price volatilities. We may enact risk mitigation programs in situations such as the following: (i) where there is a risk of financial distress; (ii) to support commercial activities and specific needs of our business segments; (iii) to ensure a minimum cash and/or value generation for certain businesses; and (iv) to protect from the increase of certain cost items, such as fuel oil used on ships and freight chartering. These programs include predominantly forward transactions, futures contracts and options.

Foreign exchange rates. Our cash flows are also exposed to the volatility of several currencies against the U.S. dollar and of interest rate on loans and financings. While most of our product prices are indexed to U.S. dollars, most of our costs, disbursements and investments are indexed to currencies other than the U.S. dollar, principally the Brazilian *real* and the Canadian dollar. We also have debt instruments denominated in currencies other than U.S. dollars, mainly in Brazilian *reals*. We may use swaps and forward transactions to convert into U.S. dollars a portion of the cash outflows of these debt instruments, and of some other assets or liabilities denominated in currencies other than U.S. dollars.

Interest rates. Our floating rate debt consists mainly of loans including export pre-payments, commercial bank loans and multilateral organization loans. In general, the U.S. dollar floating rate debt is subject to changes to LIBOR (London Interbank Offer Rate) in U.S. dollars.

See note 20 to our consolidated financial statements for quantitative information about risks relating to financial instruments, including financial instruments entered into pursuant to our risk management policies.

Operational Risk

Operational risk management is the structured approach we take to manage uncertainty related to internal and external events. Internal events consist of inadequate or failed internal processes, people and systems, while external events include natural and operational catastrophes caused by third parties.

We conduct hazard identification and risk assessment (HIRA), a process that identifies and analyzes operational risks and defines performance criteria and establishes assurance to the associated critical controls. We implemented the Hazard Identification and Risk Assessment (HIRA) process to strengthen our risk management discipline. In the first cycle, we assessed 100% of all mines, processing plants, railroads, and ports from 2019 to 2021, and we expect to conclude assessment of 100% of the tailing dams in 2022. The first cycle is focusing on scenarios with potential consequences to human life and to the environment. A second cycle is already starting in 2022 and will not only reassess scenarios covered in the first cycle but also add business interruption scenarios to the analysis. The process is part of the Element #4 of our Management System and will run in a 3 to 5-year cycle continuously. To date, more than 850 unwanted material events were identified, and the Company took more than 2,100 immediate actions to manage them, in addition to mapping out and monitoring more than 8,700 critical controls. Some of the implemented measures included changing or replacing the production process, such as replacing the use of liquid chlorine with bleach (sodium hypochlorite) in operations in Canada and reducing ammonium nitrate stocks in Mozambique. In broader terms, we are currently developing a strategic plan to reduce the use of potentially hazardous substances in its production processes.

We reduce operational risk by implementing new controls, improving existing ones, and monitoring their effectiveness. Our response plans include the high risks scenarios and identify the necessary resources to mitigate the impacts. We seek a clear view of the major risks we are exposed to, the cost-benefit on mitigation plans and the controls in place to closely monitor the impact of operational risks and to efficiently allocate capital to reduce it.

Geotechnical Risk

Geotechnical risk management is the structured approach we take to manage the risks of dams, slopes and ore piles ruptures, with the potential to cause fatalities, impacts on the community, the environment and/or interrupt the our activities.

It is the structured approach we take to manage, in particular, the risks of dams, slopes and ore piles ruptures with the potential to cause fatalities, impacts on the community, the environment and/or interrupt our activities, which are very significant to our business. Geotechnical risks are continuously monitored and are duly integrated to our enterprise risk management. We have been working on the improvement of our tailings management practices by implementing our Tailings and Dam Management System (TDMS). This system is based on the adoption of multiple layers of protection, including our three internal lines of defense and external lines of defense, such as the Engineer of Record (EoR) and the Independent Qualified Person (IQS).

The risks imposed by geotechnical structures are also evaluated by the HIRA process. The HIRA methodology was adjusted to reflect the particularities of our geotechnical structures and allow critical control tools to be implemented based on the risks identified.

Operational, Planning and Continuity Risk

Planning and operational continuity risks include risks that may paralyze operations such as the unavailability of critical resources and of place for disposal of tailings, risks of not obtaining or not renewing licenses, concessions and mining rights, logistics risks and risks of availability and quality of reserves.

Additionally, according to our in-house developed methodology to assess physical risks related to climate change, “Vale Climate Forecast”, based on TCFD recommendations, physical impacts on our assets caused by climate events are also considered operational impacts and these impacts are assessed as operational, planning and continuity risks.

Cyber Risk

Cyber risk management is the approach taken to manage information security risks, such as theft and leakage of information, technology assets unavailability and compromising data integrity. The increase on the threat landscape is a natural trend in our industry and the evolving risks in this space come from a variety of cyber threat actors like nation states, cyber criminals, hackers and insiders. We have experienced threats to the security of our information, but none of these had an impact on our business in 2021.

We employ several measures to manage this risk in order to protect, detect and respond to cyber events including information security policies and standards, security protection technologies, detection and monitoring of threats, as well as testing of response and recovery procedures. To encourage vigilance among our employees we create a culture of cybersecurity awareness in the organization through a training program covering topics such as email phishing, information classification and other information security best practices.

Credit Risk

We are exposed to credit risk arising from trade receivables, derivative transactions, guarantees, down payment for suppliers and cash investments. Our credit risk management process provides a framework for assessing and managing counterparties’ credit risk and for maintaining our risk at an acceptable level.

We assign an internal credit rating and a credit limit to each counterparty using our own quantitative methodology for credit risk analysis, which is based on market prices, external credit ratings and financial information of the counterparty, as well as qualitative information regarding the counterparty’s strategic position and history of commercial relations.

Based on the counterparty’s credit risk, risk mitigation strategies may be used to manage our credit risk. The main credit risk mitigation strategies include non-recourse discount of receivables, insurance instruments, letters of credit, corporate and bank guarantees, mortgages, among others.

From a geographic standpoint, we have a diversified accounts receivable portfolio, with Asia, Europe and Brazil, the regions with the most significant exposure. According to each region, different guarantees can be used to enhance the credit quality of the receivables. We monitor the counterparty exposure in the portfolio periodically and we block additional commercial credit to customers in delinquency.

To manage the credit exposure arising from cash investments and derivative instruments, credit limits are approved to each counterparty to which we have credit exposure. We control the portfolio diversification and monitor different indicators of solvency and liquidity of our different counterparties that were approved for trading.

Compliance Risk

Anti-Corruption Risk

Our Ethics & Compliance Program has specific anti-corruption rules, which are stated in the Code of Conduct, the Global Anti-Corruption Policy, and the Global Anti-Corruption Manual. The program, which is under the responsibility of the Audit and Compliance Department, states that we have zero tolerance for corruption and bribery in all its forms (direct or indirect).

Our main anti-corruption rules are related to:

- Political contributions directly or indirectly on behalf of Vale are prohibited. This includes company donations or contributions to political parties, political candidates, and election campaigns.
- Facilitation payments are prohibited.
- Socioenvironmental investments must be previously approved by Corporate Integrity through an internal tool and must have a contract with anti-corruption and accountability clauses.
- Gifts, meals, and entertainment involving public officials above a specific value must be previously approved by Corporate Integrity through an internal tool, and gifts in cash or equivalent are prohibited at Vale, regardless of the amount.
- All suppliers, entities, associations, or any third parties that receive funds from us, before being registered, must go through due diligence, where a background check is performed, and the risk of corruption is defined. Anti-corruption clauses must be included in the contracts.
- The process of recruiting and selecting employees and leaders who are related to any public official must also be previously approved by Corporate Integrity.
- Any conflict of interest must be disclosed by our employees (with computer access) through a global campaign carried out from time to time.
- We provide regular training and communications on our Global Anti-Corruption Rules, as well as specialized training to employees who have substantive compliance related responsibilities.

Strategic Risk

Strategic risk comprises governance, business model, external environment issues, regulatory, political, economic or social actions taken by governments or other stakeholders.

Sustainability, institutional relations and reputational risks

Social Risk

Since 2020, following the company's governance and risk management review, social risk management was incorporated into the business risk management process, and involves the assessment of the socioeconomic characteristics of the communities with which we interact, how we fulfill our commitments to them, and how the potential impacts of our operations are perceived by these communities.

In 2020-2021, our operations registered their social and human rights risks into our risk management system and developed action plans to address situations considered critical.

In addition, we conduct human rights due diligence in our projects and operations. The results are integrated into our action plans, which are monitored. We have developed a set of actions and measures to identify possible failures, to monitor environmental and social impacts, and maintain grievance channels to support dialogue with all stakeholders.

Climate Change Risk:

At Vale, we assess transition risks (*i.e.* Carbon pricing, reputation issues, new technologies issues) and physical risks (*i.e.* operational impacts caused by climate variables) related to climate change pursuant to the TCFD recommendation.

Our Climate Change Team works with our Risk Management Team to constantly map the transition risks related to climate change registered in Vale's System: Bwise.

As for physical risks, we have developed a methodology called "Vale Climate Forecast" to deal with short and long term risks related to physical impacts on our assets.

For more information, please, see <http://www.vale.com> (under English Version/Investors/ESG Portal/Environment/Climate Change). Information in our website is not incorporated by reference in this annual report on Form 20-F.

IV. SHARE OWNERSHIP AND TRADING

MAJOR SHAREHOLDERS

As of March 28, 2022, our corporate capital was composed of 4,999,040,051 common shares and 12 golden shares issued to the Brazilian government. The 12 golden shares have veto powers over certain actions, such as changes to our name, the location of our headquarters and our corporate purpose as it relates to mining activities.

The following table sets forth information regarding ownership of Vale shares by the shareholders we know beneficially own more than 5% of our outstanding capital stock, and by our directors and executive officers as a group, as of March 28, 2022, unless otherwise indicated.

	Common shares owned	% of class(5)
Caixa de Previdência dos Funcionários do Banco do Brasil (PREVI) ⁽¹⁾	413,493,256	8.7
Capital World Investors ⁽²⁾	360,598,669	7.6
Capital Research Global Investors ⁽²⁾	293,135,748	6.2
Capital International Investors ⁽²⁾	249,790,017	5.3
Mitsui & Co., Ltd. ⁽³⁾	286,347,055	6.0
BlackRock, Inc. ⁽⁴⁾	302,602,159	6.4
Board of directors and executive officers as a group	1,860,160	0.0

(1) Previ is a shareholder of Litel Participações S.A. and Litela Participações S.A., which were part of our former control group.

(2) Capital World Investors ("CWI"), Capital Research Global Investors ("CRGI") and Capital International Investors ("CII") are investment divisions of Capital Research and Management Company. Number of shares as of March 28, 2022 as communicated to us by CII on March 28, 2022.

(3) Mitsui & Co. Ltd. was part of our former control group.

(4) Number of shares as of December 31, 2021 as reported in BlackRock, Inc.'s Schedule 13G/A, filed with the SEC on February 3, 2022.

(5) All percentages are based on 4,747,282,170 common shares outstanding as of March 28, 2022. We held 251,757,881 shares in treasury as of March 28, 2022.

In 2020, the Shareholders' Agreement entered in 2017 among Litel Participações S.A. ("Litel"), Litela Participações S.A. ("Litela"), Bradespar S.A. ("Bradespar"), Mitsui and BNDESPAR Participações S.A. ("BNDESPAR") expired. Since then, there are no shareholders' agreements filed at our headquarters and we no longer have a controlling shareholder.

We were informed of the following significant changes in the percentage ownership held by our major shareholders during the past three years:

Bradespar:

- In January 2022, Bradespar transferred to its shareholders as a result of its capital reduction 130,654,877 common shares. Consequently, Bradespar reduced its shareholding interest in Vale to 163,252,389 common shares, representing an aggregate of 3.3% of our outstanding share capital (based on a total outstanding share capital of 4,821,642,536 common shares outstanding as of January 31, 2022).

BNDESPAR:

- In January 2019 and August 2020, BNDESPAR disposed of an aggregate of 16,039,700 common shares and 135,000,000 common shares, respectively, representing an aggregate of 0.3% and 2.6% of our outstanding share capital, respectively (based on a total outstanding share capital of 5,129,910,942 common shares outstanding as of June 30, 2019).
- Throughout 2020 and 2021, BNDESPAR reduced its stake in Vale. As of February 2021, BNDESPAR had disposed of all of our common shares.

Litel, Litela and PREVI:

- In August 2019, Litel distributed to its shareholders as payment of interest on shareholder's equity 95,167,645 common shares, representing an aggregate of 1.9% of our outstanding share capital, respectively (based on a total outstanding share capital of 5,129,910,942 common shares outstanding as of June 30, 2019).
- In September 2019, Litel transferred to Litela as part of its partial spin-off of Litela 808,746,864 common shares, representing an aggregate of 15.8% of our outstanding share capital (based on a total outstanding share capital of 5,129,910,942 common shares outstanding as of June 30, 2019).
- In January 2020, Litela transferred to its shareholders as a result of its capital reduction 386,040,325 common shares, representing an aggregate of 7.5% of our outstanding share capital (based on a total outstanding share capital of 5,129,910,942 common shares outstanding as of June 30, 2019).
- In February 2021, Litela transferred to its shareholders as a result of a distribution of assets to its shareholders, 504,801,150 common shares, representing an aggregate of 9.8% of our outstanding share capital (based on a total outstanding share capital of 5,129,910,942 common shares outstanding as of January 31, 2021). As a result, Litela reduced its shareholding in Vale to 0.29%. In this distribution, PREVI received 406,981,677 common shares, increasing its interest to 10.2%.

RELATED PARTY TRANSACTIONS

In 2021, we released our revised policy on related party transactions. The policy sets forth rules and principles to ensure transparency and arm's-length terms in our transactions with related parties and other situations of potential conflicts of interest. Pursuant to our new policy:

- The definition of related party is based on applicable accounting standards and on this policy, which may be more restrictive than applicable laws and regulations under certain circumstances.
- Our revised policy introduced the concept of "Reference Shareholders," which are shareholders we consider to be related parties, based on the standards set forth in the policy such as, the effective influence over Vale through a direct or known relationship, the existence of common management with such shareholder or a company that is part such shareholder's group, among others. The list of our Reference Shareholders will be annually reviewed by the Audit Committee.
- Our Audit Committee is responsible for issuing reports about potential conflicts of interest between us and our shareholders or management and for reviewing the procedure and terms of related party transactions that are submitted to our Board of Directors for approval.
- If we identify a conflict of interest with a shareholder, then that shareholder or its representative may not participate in any discussions related to the transaction at any shareholders' meeting and will only have access to publicly available information about the matter.
- If a director or an executive officer has a conflict of interest with the company in connection with any proposed transaction, such director or executive officer may not vote in any decision of the Board of Directors or of the Board of Executive Officers regarding such transaction and must disclose the nature and extent of the conflicting interest for transcription in the minutes of the meeting. Any director or executive officer who has a conflict of interest cannot receive any relevant documentation or information and may not participate in any related discussions. None of our directors or executive officers can transact any business with us, except on reasonable or fair terms and conditions that are identical to the terms and conditions prevailing in the market or offered by unrelated parties.
- The policy also prohibits the extension of any loans to related parties other than our subsidiaries and affiliated companies.

We have engaged, and expect to continue to engage, in arm's-length transactions with certain entities controlled by, or affiliated with, our major shareholders.

- Previ, a pension fund of the employees of Banco do Brasil S.A. ("Banco do Brasil"), owns 100% of the investment fund BB Carteira Ativa, which holds 80.62% of the common equity of Litela Participações S.A. and Litel Participações S.A., which in turn hold together 9.7% of the common shares of Vale as of March 28, 2022. Banco do Brasil appoints three out of the six members of Previ's senior management. An affiliate of Banco do Brasil is the manager of BB Carteira Ativa. Banco do Brasil is also a full-service financial institution, and Banco do Brasil and its affiliates have performed, and may perform in the future, investment banking, advisory or general financing and banking services for us and our affiliates, from time to time, in the ordinary course of business.
- We have commercial relationships in the ordinary course of our business with Mitsui, a large Japanese conglomerate. Mitsui has direct investments in some of our subsidiaries, joint ventures and associated companies. Mitsui is also our joint venture partner at VLI.

We have provided in the past, and may continue to provide, funding for Samarco and Fundação Renova. See *Operating and Financial Review and Prospects—Overview—Fundação Renova and Samarco Funding*.

We have engaged, and expect to continue to engage, in arm's-length transactions with certain of our associates and joint ventures. For information regarding investments in associate companies and joint ventures and for information regarding transactions with major related parties, see notes 15, 16 and 31 to our consolidated financial statements.

DISTRIBUTIONS

In July 2020, our Board of Directors reestablished our dividend policy, which had been suspended since January 2019 following the Brumadinho dam failure. Under Brazilian law and our bylaws, we are required to distribute to our shareholders an annual amount equal to not less than 25% of the distributable amount, referred to as the mandatory dividend, unless the Board of Directors advises our shareholders at our shareholders' meeting that payment of the mandatory dividend for the preceding year is inadvisable in light of our financial condition. For a discussion of dividend distribution provisions under Brazilian corporate law and our bylaws, see *Additional Information—Bylaws*.

The tax regime applicable to distributions to non-resident shareholders and holders of ADRs will depend on whether those distributions are classified as dividends or as interest on shareholders' equity. See *Additional Information—Taxation—Brazilian tax considerations*.

By law, we are required to hold an annual shareholders' meeting by April 30 of each year at which an annual dividend may be declared. Additionally, our Board of Directors may declare interim dividends. Under Brazilian corporate law, dividends are generally required to be paid to the holder of record on a dividend declaration date within 60 days following the date the dividend was declared, unless a shareholders' resolution sets forth another date of payment, which, in either case, must occur prior to the end of the fiscal year in which the dividend was declared. A shareholder has a three-year period from the dividend payment date to claim dividends (or payments of interest on shareholders' equity) in respect of its shares, after which we will have no liability for such payments.

We make cash distributions on the common shares underlying the ADSs in *reais* to the custodian on behalf of the depository. The custodian then converts such proceeds into U.S. dollars and transfers such U.S. dollars to be delivered to the depository for distribution to holders of ADRs net of the depository's fees. For information on taxation of dividend distributions, see *Additional Information—Taxation—Brazilian tax considerations*.

The following table sets forth the cash distributions we paid to holders of common shares and preferred shares for the years indicated. Amounts have been restated to give effect to stock splits that we carried out in subsequent periods. Amounts are stated before any applicable withholding tax.

Year	Payment date	Reais per share			U.S. dollars	U.S. dollars
		Dividends	Interest on equity	Total	per share(1)	total(1)
					Total	(US\$ million)
2017	April 28, 2017	–	0.91	0.91	0.28	1,459
2018	March 15, 2018	–	0.91	0.91	0.28	1,437
	September 20, 2018	0.17	1.31	1.48	0.36	1,876
2019(2)	August 7, 2020	–	1.41	1.41	0.25	1,324
2020	September 30, 2020	1.41	1.00	2.41	0.45	2,329
2021	March 15, 2021	3.42	0.83	4.26	0.77	3,972
	June 30, 2021	2.19	–	2.19	0.43	2,200
	September 30, 2021	8.20	–	8.20	1.53	7,644
2022	March 16, 2022	3.72	–	3.72	0.72	3,500

(1) As approved by the Board of Directors.

(2) Amounts were approved by the Board of Directors on December 19, 2019, and payment of the amounts was approved on July 29, 2020.

TRADING MARKETS

Our publicly traded share capital consists of common shares, without par value. Our common shares are publicly traded in Brazil on the B3, under the ticker symbol VALE3. Our common shares also trade on the LATIBEX, under the ticker symbols XVALO. The LATIBEX is a non-regulated electronic market created in 1999 by the Madrid stock exchange in order to enable trading of Latin American equity securities.

Our common ADSs, each representing one common share, are traded on the NYSE, under the ticker symbol VALE. Citibank N.A. serves as the depositary for the common ADSs. On December 31, 2021, there were 1,509,532,682 common ADSs outstanding, representing 29.4% of our total share capital.

DEPOSITARY SHARES

Citibank N.A. serves as the depositary for our ADSs. ADR holders are required to pay various fees to the depositary, and the depositary may refuse to provide any service for which a fee is assessed until the applicable fee has been paid.

ADR holders are required to pay the depositary amounts in respect of expenses incurred by the depositary or its agents on behalf of ADR holders, including expenses arising from compliance with applicable law, taxes or other governmental charges, facsimile transmission or conversion of foreign currency into U.S. In this case, the depositary may decide in its sole discretion to seek payment by either billing holders or by deducting the fee from one or more cash dividends or other cash distributions. The depositary may recover any unpaid taxes or other governmental charges owed by an ADR holder by billing such holder, by deducting the fee from one or more cash dividends or other cash distributions, or by selling underlying shares after reasonable attempts to notify the holder, with the holder liable for any remaining deficiency.

ADR holders are also required to pay additional fees for certain services provided by the depositary, as set forth in the table below.

<u>Depositary service</u>	<u>Fee payable by ADR holders</u>
Issuance of ADSs upon deposit of shares, excluding issuances as a result of distributions described in the following item	Up to US\$5.00 or less per 100 ADSs (or fraction thereof) issued
Distribution of securities other than ADSs or rights to purchase additional ADSs (i.e., spin-off shares)	Up to US\$5.00 or less per 100 ADSs (or fraction thereof) held
Distribution of cash dividends or other cash distributions (i.e., sale of rights and other entitlements)	Up to US\$5.00 or less per 100 ADSs (or fraction thereof) held
Distribution of ADSs pursuant to (i) stock dividends or other free stock distributions, or (ii) exercise of rights to purchase additional ADSs	Up to US\$5.00 or less per 100 ADSs (or portion thereof) held
Delivery of deposited property against surrender of ADSs	Up to US\$5.00 or less per 100 ADSs (or portion thereof) surrendered
ADS services	Up to US\$5.00 per 100 ADSs (or fraction thereof) held on the applicable record date(s) established by the depositary

The depositary may deduct applicable depositary fees and charges from the funds being distributed in the case of cash distributions. For distributions other than cash, the depositary will invoice the amount of the applicable depositary fees to the applicable holders.

ADDITIONAL CHARGES

The holders, beneficial owners, persons depositing shares and persons surrendering ADSs for cancellation and for the purpose of withdrawing deposited securities are also subject to the following charges: (i) taxes (including applicable interest and penalties) and other governmental charges; (ii) registration fees as may be applicable from time to time; (iii) reimbursement of certain expenses as provided in the deposit agreement; (iv) the expenses and charges incurred by the depositary in the conversion of foreign currency; (v) certain fees and expenses incurred by the depositary in connection with compliance with exchange control regulations and other regulatory requirements; and (vi) certain fees and expenses incurred in connection with the delivery or servicing of deposited shares, as provided for under the deposit agreement.

The depositary reimburses us for certain expenses we incur in connection with the ADR program and other expenses, subject to a ceiling agreed between us and the depositary from time to time. These reimbursable expenses currently

include legal and accounting fees, listing fees, investor relations expenses and fees payable to service providers for the distribution of material to ADR holders. The depositary also agreed to make an additional reimbursement annually based on the issuance and cancellation fees, dividend fees and depositary service fees charged by the depositary to our ADS holders. For the year ended December 31, 2021, Citibank N.A. reimbursed us US\$3.190 million.

PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

In October 2021, we announced (i) the completion of the share repurchase program approved by the Board of Directors on April 1, 2021 (Program 1) and (ii) the approval of a new share buyback program to repurchase 200 million common shares (Program 2). Our subsidiaries Vale Holdings B.V. and MBR have also purchased our shares as part of Program 1 and may continue to purchase our shares as part of Program 2.

Pursuant to Program 1, we acquired 270,000,000 common shares at an average price of US\$19.55 per share (including common shares represented by ADSs), for a total aggregate purchase price of approximately US\$5.3 billion. Shares repurchased under Program 1 represented 5.3% of the free float of common shares outstanding before launching the program.

Pursuant to Program 2, through December 31, 2021 we had acquired 21,854,500 common shares at an average price of US\$12.47 per share (including common shares represented by ADSs), for a total aggregate purchase price of approximately US\$0.3 billion. Shares repurchased under Program 2 represent 0.4% of the free float of common shares outstanding before launching the program.

See note 30 to our consolidated financial statements for further information about Program 1 and Program 2.

The results of our share repurchase program for 2021 – Program 1 are set forth below.

	Total number of common shares purchased ⁽¹⁾	Average price paid per common share (US\$)	Total number of common shares purchased as part of publicly announced programs	Maximum number of shares that may yet be purchased under the program
April 2021	5,338,015	19.95	5,338,015	264,661,985
May 2021	41,930,685	21.11	41,930,685	222,731,300
June 2021	45,819,500	22.08	45,819,500	176,911,800
July 2021	28,629,142	22.23	28,629,142	148,282,658
August 2021	67,738,053	20.34	67,738,053	80,544,605
September 2021	49,405,552	16.74	49,405,552	31,139,053
October 2021	29,712,053	14.07	29,712,053	1,427,000
November 2021	1,427,000	12.84	1,427,000	-
Total	270,000,000	19.56	270,000,000	-

(1) Includes common shares represented by ADSs.

Summary of Program 1 (amounts in millions)

Company	Quantity	Amount US\$
Vale S.A.	139	3,008.3
MBR S.A.	73	1,301.9
Vale Holdings B.V.	58	971.3
Total	270	5,281.5

The results of our share repurchase program for 2021 – Program 2 are set forth below.

	Total number of common shares purchased(1)	Average price paid per common share	Total number of common shares purchased as part of publicly announced programs	Maximum number of shares that may yet be purchased under the program
		(US\$)		
November 2021	16,038,900	12.04	16,038,900	183,961,100
December 2021	5,145,600	13.80	5,145,600	178,815,500
Total	21,184,500	12.47	21,184,500	178,815,500

(1) Includes common shares represented by ADRs.

Summary of the program 2 (amounts in millions)

Company	Quantity	Amount US\$
Vale S.A.	-	-
MBR S.A.	11	135.8
Vale Holdings B.V.	10	128.2
Total	21	264.0

V. MANAGEMENT AND EMPLOYEES

MANAGEMENT

BOARD OF DIRECTORS

Our Board of Directors sets general guidelines and policies for our business and monitors the implementation of those guidelines and policies by our executive officers. In March 2021, our shareholders approved a number of changes to our bylaws relating to our Board of Directors.

- Our bylaws provide for a Board of Directors consisting of 11 to 13 members, and one alternate for the director elected by our employees. One member of the Board of Directors and his or her alternate are directly elected by our employees, in a separate election. In the event of any vacancy or absence or impediment of a member of the Board of Directors, the remaining members may appoint a substitute member until the next general shareholders' meeting.
- Our shareholders vote to elect the members of our Board of Directors on an individual basis (as opposed to voting for a slate of candidates).
- Our shareholders elect the chairperson and vice-chairperson of our Board of Directors directly. Prior to the March 2021 changes to our bylaws, the chairman and vice-chairman were elected by the directors.
- We currently have eight independent members in our Board of Directors, out of a total of 13 members.
- Our chief executive officer is not a member of our Board of Director.
- In the event that the chairperson of the Board of Directors is not an independent member, the independent directors must appoint a lead independent director (LID). As of the date hereof, our chairperson is an independent director.
- Under the rules of the Novo Mercado, to be considered independent, a director may not (i) be a controlling shareholder of Vale; (ii) have its vote subject to a shareholder's agreement; (iii) be a relative, to the second degree, of any director or executive of Vale; or (iv) have been an employee or executive of Vale in the past three years. The Novo Mercado rules also provide for other situations that require a case-by-case analysis of the independence of a director. Since March 2021, our bylaws provide that, in addition to the Novo Mercado independence standards, to be considered independent, a director may not (i) hold more than 5% of our share capital or have any formal or declared relation with any shareholder holding more than 5% of our share capital; or (ii) have been a director of Vale for five or more consecutive or non-consecutive terms or for 10 or more consecutive or non-consecutive years. The current independent members of our Board of Directors are in compliance with the rules established by the Novo Mercado special segment of B3 and our bylaws.

In our last general shareholders' meeting, held in 2021, our shareholders elected 12 members by the cumulative voting process, and one effective member and his alternate were elected by our employees in a separate election. In November 2021, Mr. José Maurício Pereira Coelho resigned from our Board of Directors. In light of the resignation, our Board of Directors appointed Mr. Daniel André Stieler as a member of the Board of Directors, to hold office until the next general shareholders' meeting to be held in 2022. As Mr. Coelho had been elected by the cumulative voting process and in accordance with Brazilian Corporate Law, the general shareholders' meeting to be held in 2022 will vote on the election of 12 members of the Board, who will hold office until the general shareholders' meeting to be held in 2023.

The Board of Directors holds regularly scheduled meetings at least eight times per year and holds additional meetings when called by the chairperson, vice-chairperson or one-third of the directors. Decisions of the Board of Directors require a quorum of a majority of the directors and are taken by majority vote. Under Brazilian corporate law, a director that resides or is domiciled in another country is required to appoint a representative residing in Brazil, with powers for at least 3 years after the end of the director's term of office.

The following tables lists the current and alternate members of the Board of Directors.

Director	Year first elected
José Luciano Duarte Penido (chairman) ⁽¹⁾	2019
Fernando Jorge Buso Gomes (vice-chairman)	2015
Daniel André Stieler ⁽²⁾	2021
Eduardo de Oliveira Rodrigues Filho	2019
Ken Yasuhara	2021
Lucio Azevedo ⁽³⁾	2015
Manuel Lino Silva de Sousa Oliveira ⁽¹⁾	2021
Marcelo Gasparino da Silva ⁽¹⁾	2020
Mauro Gentile Rodrigues da Cunha ⁽¹⁾	2021
Murilo Cesar Lemos dos Santos Passos ⁽¹⁾	2019
Rachel de Oliveira Maia ⁽¹⁾	2021
Roberto da Cunha Castello Branco ⁽¹⁾	2021
Roger Allan Downey ⁽¹⁾	2019

(1) Independent directors.

(2) Appointed by our Board of Directors until the general shareholders' meeting of 2022.

(3) Appointed by our employees.

Alternate Director	Year first elected
André Viana Madeira ⁽¹⁾	2021

(1) Appointed by our employees as alternate of Lucio Azevedo.

Below is a summary of the business experience, activities and areas of expertise of our current directors.

JOSÉ LUCIANO DUARTE PENIDO

CHAIRMAN, INDEPENDENT MEMBER OF THE SUSTAINABILITY COMMITTEE, AND INDEPENDENT MEMBER OF THE PEOPLE, COMPENSATION AND GOVERNANCE COMMITTEE

Born:	1948
First elected	2019
Business experience:	Independent Director of Algar S.A. Independent Director of Copersucar S.A. Independent Director of Banco Santander Brasil Independent Director of Química Amparo Ypê Chairman of the Board of Directors of Fibria Celulose

FERNANDO JORGE BUSO GOMES

VICE CHAIRMAN, CHAIRMAN OF THE FINANCE COMMITTEE AND MEMBER OF THE PEOPLE, COMPENSATION AND GOVERNANCE COMMITTEE

Born:	1956
First elected	2015
Other current activities and director or officer positions:	Director, CEO, and Investor Relation Officer of Bradespar S.A. Executive Officer of Millennium Security Holding Corp

Business experience:	Chairman of the Board of Directors of Bradespar S.A. Director, Executive Officer, and CEO of 2B Capital S.A. Vice-Chairman of Board of Directors, Director and Executive Officer of Valepar S.A. Member of Vale's Executive Development Committee Member of Vale's Strategy Committee
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DANIEL ANDRÉ STIELER**DIRECTOR, MEMBER OF THE FINANCE COMMITTEE**

Born:	1965
First elected	2021
Other current activities and director or officer positions:	President of PREVI Member of the Board of Directors of Alelo S.A.

Business experience:	Superintendent Officer, President of the Deliberative Council and Member of the Fiscal Council of Economus Instituto de Seguridade Social Director of Livelô S.A. Director of Controllershship of Banco do Brasil S.A. Member of the Advisory and Finance Council of Banco Votorantim S.A. Member of the Financial Institutions Accounting Affairs Committee at Febraban Member of the Deliberative Council of UniAbraap Member of the Deliberative Council of ABRAPP
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EDUARDO DE OLIVEIRA RODRIGUES FILHO**DIRECTOR AND MEMBER OF THE OPERATIONAL EXCELLENCE AND RISK COMMITTEE AND MEMBER OF THE SUSTAINABILITY COMMITTEE**

Born:	1954
First elected	2019
Other current activities and director or officer positions:	Managing Partner of CWH Consultoria em Gestão Empresarial

Business experience:	Member of Vale's Finance Committee and Sustainability Committee Chairman of Vale's Operational Excellence and Risk Committee Director and Alternate Director of Valepar S.A. Commercial Director of Rio Tinto Brasil Commercial Manager at Minerações Brasileiras Reunidas S.A.
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KEN YASUHARA**DIRECTOR AND MEMBER OF THE INNOVATION COMMITTEE**

Born:	1978
First elected	2021
Other current activities and director or officer positions:	Officer of Mitsui & Co. (Brasil) S.A.

Business experience:	Alternate Member of the Board of Directors of Alumina do Norte do Brasil Member of Vale's Finance Committee Alternate Member of Vale's Board of Directors
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LUCIO AZEVEDO**DIRECTOR**

Born:	1958
First elected	2015
Other current activities and director or officer positions:	Employee of Vale (currently released for union activity)
Business experience:	President of the Employees' Union of Railway Companies of the Brazilian states of Maranhão, Pará and Tocantins

MANUEL LINO SILVA DE SOUSA OLIVEIRA

DIRECTOR, INDEPENDENT CHAIRMAN OF THE AUDIT COMMITTEE AND INDEPENDENT MEMBER OF THE PEOPLE, COMPENSATION, AND GOVERNANCE COMMITTEE

Born:	1952
First elected	2021
Other current activities and director or officer positions:	-
Business experience:	Senior Independent Member of the Board of Directors of Polymetal International PLC Senior Independent Member of the Board of Directors of Antofagasta PLC Senior Non-Executive Independent Member of the Board of Directors Blackrock World Mining Investment Trust PLC

MARCELO GASPARINO DA SILVA

DIRECTOR, INDEPENDENT MEMBER OF THE OPERATIONAL EXCELLENCE AND RISK COMMITTEE AND INDEPENDENT CHAIRMAN OF THE SUSTAINABILITY COMMITTEE

Born:	1971
First elected	2020 (Alternate since 2019)
Other current activities and director or officer positions:	Director of Petróleo Brasileiro S.A – Petrobras Chairman of the Board of Directors of ETERNIT S.A. Director of Companhia Energética de Minas Gerais – CEMIG
Business experience:	Alternate Member of the Board of Directors of Vale Director of Kepler Weber S.A. Director of Companhia Catarinense de Águas e Saneamento – CASAN Director of Centrais Elétricas Brasileiras de Santa Catarina – CELESC Director of AES Brasil Director of Eletrobras Member of the Fiscal Council of Petróleo do Brasileiro S.A – Petrobras Director and Member of the Audit Committee of Eletropaulo

MAURO GENTILE RODRIGUES DA CUNHA

DIRECTOR, INDEPENDENT MEMBER OF THE AUDIT COMMITTEE AND INDEPENDENT CHAIRMAN OF THE PEOPLE, COMPENSATION AND GOVERNANCE COMMITTEE

Born:	1971
First elected	2021

Other current activities and director or officer positions:	Director and Member of the Risks and Audit Committees of brMalls Director and Member of the Audit and People, Compensation Committees of Totvs Director of Klabin
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Business experience:	Chairman of the Board of Directors of Caixa Econômica Federal President of AMEC Director of Eletrobras and Chairman of the Audit Committee Director of Mahle Metal Leve Director of Cia Energética do Estado de São Paulo Independent Director of Petrobras Chairman of the Board of Directors of IBGC
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MURILO CÉSAR LEMOS DOS SANTOS PASSOS

DIRECTOR, INDEPENDENT MEMBER OF THE FINANCE COMMITTEE AND INDEPENDENT MEMBER OF THE AUDIT COMMITTEE

Born:	1947
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First elected	2019
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Other current activities and director or officer positions:	Director of Odontoprev S.A. Chairman of the Board of Directors of São Martinho S.A. Chairman of the Board of Directors of Tegma Gestão e Logística S.A.
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Business experience:	Director and Member of the Board of Directors of Suzano Holding S.A. Chairman of the Board of Directors of CCR S.A. Chairman of the Board of Directors of CPFL Energia CEO of Suzano Bahia Sul Papel e Celulose S.A.
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RACHEL DE OLIVEIRA MAIA

DIRECTOR AND INDEPENDENT MEMBER OF THE SUSTAINABILITY COMMITTEE

Born:	1971
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First elected	2021
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Other current activities and director or officer positions:	Founder and CEO of RM Consulting Member of the Grupo de Mulheres Brasileiras Member of the Social and Economic Committee of the Conselho de Desenvolvimento
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Business experience:	Member of General Board of the Danish Consulate Member of Danish Chamber of Commerce CEO of Lacoste S.A. (Brasil) CEO of Pandora Brasil Member of the Instituto para o Desenvolvimento do Varejo CFO of Tiffany & Co. Brasil Senior Business Controller at Novartis Pharmacy Senior Financial Controller at 7-Eleven
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ROBERTO DA CUNHA CASTELLO BRANCO

DIRECTOR, INDEPENDENT MEMBER OF THE FINANCE COMMITTEE, AND INDEPENDENT CHAIRMAN OF THE INNOVATION COMMITTEE

Born:	1944
First elected	2021
Business experience:	Chairman of the Board of Directors of Petrobras Officer of the Getulio Vargas Foundation's Center for Economic Growth and Development Studies Member of the Board of Directors of Invepar S.A. Member of the Board of Directors of GRU Airport Member of the CEO Steering Committee of the Oil and Gas Climate Initiative (OGCI) and the US Brazil CEO Forum

ROGER ALLAN DOWNEY**DIRECTOR, INDEPENDENT CHAIRMAN OF THE OPERATIONAL EXCELLENCE AND RISK COMMITTEE AND INDEPENDENT MEMBER OF THE INNOVATION COMMITTEE**

Born:	1967
First elected	2019
Other current activities and director or officer positions:	Director of Fertimar S.A. (PrimaSea)
Business experience:	Director of Tupy S.A. Member of the Board of Directors and CEO of Fertimar S.A. (PrimaSea) CEO of Vale Fertilizantes S.A. Executive Officer of Coal, Fertilizer and Strategy at Vale CEO of MMX Mineração e Metálicos S.A. Director of Mining & Steel Research of Credit Suisse Commercial manager of Rio Tinto Brasil

EXECUTIVE OFFICERS

The executive officers are responsible for day-to-day operations and the implementation of the general policies and guidelines set forth by our Board of Directors. Our bylaws provide for a minimum of six and a maximum of 11 executive officers. The executive officers hold weekly meetings and hold additional meetings when called by any executive officer. Under Brazilian corporate law, an executive officer that resides or is domiciled in another country is required to appoint a representative residing in Brazil, with powers for at least 3 years after the end of the executive officer's term of office.

The executive officers are appointed and may be removed by our Board of Directors at any time. Since our shareholders' meeting held on April 30, 2021, our bylaws provide for the appointment of executive officers for three-year terms.

The following table lists our current executive officers.

Officer	Year of appointment	Position
Eduardo de Salles Bartolomeo	2019	Chief Executive Officer
Gustavo Duarte Pimenta	2021	Chief Financial Officer and Executive Officer for Investor Relations
Alexandre Silva D'Ambrósio	2021	Executive Officer for Legal
Alexandre Gomes Pereira	2017	Executive Officer for Global Business Support
Carlos Henrique Senna Medeiros	2019	Executive Officer for Safety and Operational Excellence

Luciano Siani Pires	2012	Executive Officer for Strategy and Business Transformation
Luiz Eduardo Fróes do Amaral Osorio	2017	Executive Officer for Institutional Relations and Communication
Marcello Magistrini Spinelli	2019	Executive Officer for Ferrous Minerals
Maria Luiza de Oliveira Pinto e Paiva	2021	Executive Officer for Sustainability
Marina Barrenne de Artagão Quental	2021	Executive Officer for People

Below is a summary of the business experience, activities and areas of expertise of our current executive officers.

EDUARDO DE SALLES BARTOLOMEO

CHIEF EXECUTIVE OFFICER

Born: 1964

Appointed: 2019

Business experience: Director of Login Logística Intermodal
Executive Officer for Base Metals of Vale Canada
Director of Vale
Chairman of Vale's Operational Excellence and Risk Committee
Member of Finance Committee and Strategic Committee of Vale
CEO of Nova Transportadora do Sudeste
Director of Arteris S.A.
CEO of BHG—Brazilian Hospitality Group
Head of Logistical Operations of Vale
Director of MRS Logística S.A.

GUSTAVO DUARTE PIMENTA

CHIEF FINANCIAL OFFICER, EXECUTIVE OFFICER - INVESTOR RELATIONS

Born: 1978

Appointed: 2021

Business experience: Independent Member of the Board of Directors of J.M. Huber
CFO of The AES Corporation
Member of the Board of Directors of AES Clean Energy
VP Strategy and M&A of Citibank

ALEXANDRE SILVA D'AMBRÓSIO

EXECUTIVE OFFICER - LEGAL

Born: 1969

Appointed: 2021

Other current activities and director or officer positions: Executive Officer of Vale International
Director of PT Vale – Indonesia

Business experience: General Counsel of Vale
Executive Vice-President of Banco Santander S.A.
General Counsel and Global Vice-President of Grupo Votorantim

ALEXANDRE GOMES PEREIRA

EXECUTIVE OFFICER - GLOBAL BUSINESS SUPPORT

Born:	1969
Appointed:	2017
Business experience:	Senior Vice-President and Global Chief Information Officer of Vale based in Canada Global IT Services Director of Vale Global Chief Information Officer, Base Metals, of Vale Inco

CARLOS HENRIQUE SENNA MEDEIROS**EXECUTIVE OFFICER - SAFETY AND OPERATIONAL EXCELLENCE**

Born:	1963
Appointed:	2019
Business experience:	Executive President for North and Central America of Ball Corporation Chairman of the Board of Directors of Envases de Centro América Executive President for South America of Ball Corporation Executive President for South America of Rexam PLC

LUCIANO SIANI PIRES**EXECUTIVE OFFICER - STRATEGY AND BUSINESS TRANSFORMATION**

Born:	1970
Appointed:	2012
Other current activities and director or officer positions:	Director of The Mosaic Company Chairman of the Board of Directors of VLI S/A
Business experience:	Executive Officer of Vale (Finance and Investor Relations) Member of Finance Committee of Vale Global Officer of Strategic Planning and Global Officer of Human Resources and Governance of Vale Alternate Director of Vale Director of Valepar

LUIZ EDUARDO FRÓES DO AMARAL OSORIO**EXECUTIVE OFFICER - INSTITUTIONAL RELATIONS AND COMMUNICATION**

Born:	1974
Appointed:	2017
Business experience:	Executive Vice-President of Legal and Company Relations of CPFL Energia S.A. Director of CPFL Energias Renováveis S.A. Vice-Chairman of the Board of Directors of Instituto CPFL Executive Director of International Markets and Vice President for Sustainable Development and External Affairs of Raízen

MARCELLO MAGISTRINI SPINELLI**EXECUTIVE OFFICER - FERROUS MINERALS**

Born:	1973
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Appointed:	2019
Business experience:	CEO of VLI Logística S.A. CEO of Ferrovia Centro Atlântica Director of Ferrovia Norte e Sul Various positions at Vale, including Logistics Officer

MARIA LUIZA DE OLIVEIRA PINTO E PAIVA **EXECUTIVE OFFICER - SUSTAINABILITY**

Born:	1963
Appointed:	2021
Business experience:	Executive Officer for Sustainability of Suzano S.A. Executive Officer for Sustainability of Fibria S.A.

MARINA BARRENNE DE ARTAGÃO QENTAL **EXECUTIVE OFFICER – PEOPLE**

Born:	1964
Appointed:	2021
Business experience:	Officer for People at Vale Vice President for Human Resources at Raízen Energia S.A. President of Raízen Foundation Human Resource director of Shell Brasil Member of Deliberative Board of the Rio de Janeiro Sectional of the Brazilian Association of Human Resources Professionals (ABRH/RJ) – professional class association.

AUDIT COMMITTEE

On March 11, 2020, our Board of Directors established an Audit Committee in accordance with the governance rules of Novo Mercado segment of B3.

Under our bylaws and the Audit Committee's charter, (i) our Audit Committee shall have three to five members, (ii) each member must comply with the independence requirements of our bylaws and the requirements of the Novo Mercado listing rules, (iii) at least one member must be an independent member of our Board of Directors, (iv) at least one member must not be a member of our Board of Directors and (v) at least one member must satisfy the accounting/financial expertise requirements of the CVM. All members of our Audit Committee are appointed by the Board of Directors. The terms of the members of the Audit Committee expire at the end of the term of the members of the Board of Directors, upon removal approved by the Board of Directors or resignation, pursuant to the Audit Committee's charter.

We are subject to Rule 10A-3 under the Exchange Act, which requires, absent an exemption, that a listed company maintain an Audit Committee composed of members of the Board of Directors that meet specified requirements. We rely on our Audit Committee to meet the exemption requirements under paragraph (c)(3) of Rule 10A-3.

The following table lists the current members of the Audit Committee.

Current member	Year first elected
Luciana Pires Dias (1)(3)	2020
Manuel Lino Silva de Sousa Oliveira (2)	2021
Mauro Gentile Rodrigues da Cunha (2)	2021
Murilo César Lemos dos Santos Passos (2)	2021
Sergio Ricardo Romani (1)(3)	2020

(1) Not a member of our Board of Directors.

(2) Member of our Board of Directors.

(3) Accounting / financial / external expert.

Below is a summary of the business experience, activities and areas of expertise of the members of our Audit Committee.

LUCIANA PIRES DIAS

Born: 1976

Appointed: 2020

Other current activities and director or officer positions: Partner at L. Dias Advogados
Member of the Audit Committee of B3 S.A. – Bolsa, Brasil, Balcão
Professor at Fundação Getúlio Vargas
Member of the Audit Committee of CERC Serviços de Desenvolvimento de Sistemas para Recebíveis Ltda.

Business experience: Director of BNDES Participações S.A.
Member of the Audit Committee of Banco Nacional de Desenvolvimento Econômico e Social – BNDES
Member of the Technical Committee of CERC Serviços de Desenvolvimento de Sistemas para Recebíveis Ltda.
Professor at Fundação Getúlio Vargas
Director at Comissão de Valores Mobiliários – CVM

MANUEL LINO SILVA DE SOUSA OLIVEIRA

Please see summary under Board of Directors

MAURO GENTILE RODRIGUES DA CUNHA

Please see summary under Board of Directors

MURILO CÉSAR LEMOS DOS SANTOS PASSOS

Please see summary under Board of Directors

SERGIO RICARDO ROMANI

Born:	1959
Appointed:	2020
Other current activities and director or officer positions:	Partner at SR Assessoria e Consultoria de Negócios Ltda Member of the Board of Directors and Member of the Audit Committee of CBA - Cia Brasileira de Alumínio Member of the Board of Directors and Chairman of the Audit Committee of CESP
Business experience:	Partner and CEO for Latin America South at Ernst & Young (EY) (1983-2019)

OTHER ADVISORY COMMITTEES TO THE BOARD OF DIRECTORS

Our bylaws provide for the following advisory committees to the Board of Directors, each governed by its own internal rules. Additional Committees may be created by the Board of Directors, at their discretion.

Audit Committee: for further information on our audit committee, please see “*Audit Committee*” in this section.

Finance Committee: responsible for advising the Board in relation to our business plan, financial policies, strategic issues and their execution, such as strategies concerning business, investment and divestment opportunities, corporate restructuring, shareholder remuneration levels; minimum cash and financial investments policy, asset portfolio management and efficient capital allocation, annual budget, investment, and funding plans, indebtedness limits, financial risks monitoring and controls, among other matters. Its current members are Fernando Jorge Buso Gomes (Chairman), Adriano Cives Seabra, Daniel André Stieler, Murilo César Lemos dos Santos Passos and Roberto da Cunha Castello Branco.

People, Compensation and Governance Committee: responsible for assisting the Board in all aspects regarding the management of senior level human assets, including, but not limited to: evaluating human resources policies; monitoring and encouraging diversity, inclusion and other organizational culture initiatives; evaluating the Board’s compensation model and executive compensation budget; defining and monitoring executive performance assessment goals and succession plans; nominating members to the Advisory Committees, evaluating proposals to amend corporate documents, among other responsibilities. Its current members are Mauro Gentile Rodrigues da Cunha (Chairman), Fernando Jorge Buso Gomes, José Luciano Duarte Penido, Manuel Lino Silva de Sousa Oliveira and Oscar Augusto Camargo Filho.

Operational Excellence and Risk Committee: responsible for ensuring that we have the necessary structure and practices in place to effectively identify and manage geotechnical and operational risks, including matters of health and safety. Among other matters, it assists the Board in monitoring our Integrated Risk Map and Matrix of Operational and Geotechnical Risk, assessing our risk exposure and proposing risk tolerance levels and risk mitigation plans. It also helps monitoring our governance model known as Vale Production System (“VPS”) to ensure the best safety and environmental practices. Its current members are Roger Allan Downey (Chairman), Eduardo de Oliveira Rodrigues Filho, André Viana Madeira, Antônio Umberto Benetti Queiroz and Marcelo Gasparino da Silva.

Sustainability Committee: responsible for assisting the Board on matters relating to sustainability, including assessment of our performance, current and proposed investments and research, as well as our institutional, social, environmental and community relationships. It also assists in monitoring the remedial actions related to the dam rupture in Brumadinho and Samarco’s dam rupture in Mariana, pursuant to the Ad Hoc Consulting Committee for

Support and Reparation (CIAE-AR) standards, among other responsibilities. Its current members are Marcelo Gasparino da Silva (Chairman), Carlos Alberto de Oliveira Roxo, Eduardo de Oliveira Rodrigues Filho, José Luciano Duarte Penido and Rachel de Oliveira Maia.

Nomination Committee: responsible for assisting the Board in all matters relating to our Nomination Policy, applicable to the members of the Board of Directors, in accordance with the legal requirements and the best corporate governance practices, including selection of candidates, structure, composition, diversity, governance and expertise of the Board, among other matters. The last Nomination Committee was elected on January 27, 2022, to advise our Board of Directors on the nomination of the candidates for the election of the Board of Directors at the general shareholders' meeting to be held on April 2022. Its members were José Luciano Duarte Penido (Chairman), Daniel André Stieler, Murilo César Lemos dos Santos Passos and Roberto da Cunha Castello Branco. This committee presented its final report to the Board of Directors on March 3, 2022.

Innovation Committee: created in March 2021, it advises the Board in relation to Digital Transformation, Research, Development and Innovation and its approach in our current practices and planning, to foster and facilitate innovation within our business. It also advises the Board on initiatives related to mineral research, new technologies and new products as well as R&D&I projects and new investments. Its current members are Roberto da Cunha Castello Branco (Chairman), Ken Yasuhara, Luiz Carlos Affonso and Roger Allan Downey.

FISCAL COUNCIL

We have a Fiscal Council established in accordance with Brazilian law. The primary responsibilities of the Fiscal Council under Brazilian corporate law are to supervise management's activities, review the company's financial statements, and report its findings to the shareholders.

Brazilian law requires the members of a Fiscal Council to meet certain eligibility requirements. A member of our Fiscal Council cannot (i) hold office as a member of the Board of Directors, Fiscal Council or advisory committee of any company that is a competitor of Vale or otherwise has a conflicting interest with Vale, unless compliance with this requirement is expressly waived by shareholder vote, (ii) be an employee or member of senior management or the Board of Directors of Vale or its subsidiaries or affiliates, or (iii) be a spouse or relative within the third degree by affinity or consanguinity of an officer or director of Vale.

Members of the Fiscal Council are elected by our shareholders for one-year terms. The current members of the Fiscal Council and their respective alternates were elected on April 30, 2021. The terms of the members of the Fiscal Council expire at the next annual shareholders' meeting following election. Our Fiscal Council shall be composed of three to five members. The holders of our golden shares are entitled to appoint one member.

The following table lists the current and alternate members of the Fiscal Council.

Current member	Year first elected	Alternate	Year first elected
Bruno Funchal(1)	2020	Vacant	-
Cristina Fontes Doherty(2)	2020	Nelson de Menezes Filho	2019
Marcelo Amaral Moraes(2)	2004	Vacant	-
Marcus Vinícius Dias Severini(2)	2017	Vera Lucia de Almeida Pereira Elias	2021
Raphael Manhães Martins(2)	2015	Adriana de Andrade Solé	2021

(1) Appointed by the holder of golden shares.

(2) Appointed by shareholders of common shares.

Below is a summary of the business experience, activities and areas of expertise of the members of our Fiscal Council.

BRUNO FUNCHAL

Born: 1976

Appointed: 2020

Other current activities and director or officer positions:	Professor at FUCAPE Business School
Business experience:	Chairman of the Fiscal Council of Caixa Econômica Federal Program Director at the Special Secretariat of Finance of the Ministry of Economy Finance Secretary of the State of Espírito Santo Member of the Fiscal Council of Sociedade Brasileira de Econometria Member of the Working Group of the Ministry of Finance regarding the New Bankruptcy Managing Partner of AlphaMar Investimentos

CRISTINA FONTES DOHERTY

Born:	1965
Appointed:	2020
Business experience:	Alternate Member of the Fiscal Council of Invepar S.A. Alternate Member of the Board of Directors of CSP - Companhia Siderúrgica do Pecém Alternate Member of the Board of Directors of Thyssenkrupp Companhia Siderúrgica do Atlântico Member of the Financial-Operational Committee of California Steel Director of Vale Oman

MARCELO AMARAL MORAES

Born:	1967
Appointed:	2004
Other current activities and director or officer positions:	Director of CPFL Energia S.A. Member of the Fiscal Council of Gol Linhas Aéreas Inteligentes S.A.
Business experience:	Member of the Fiscal Council of Linx S.A. Member of the Fiscal Council of Ultrapar Participações S.A. Member of the Board of Directors of CPFL Energia S.A. Member of the Fiscal Council of Aceco TI S.A. Director of Eternit S.A. Managing Director of Capital Dynamics Investimentos Ltda.

MARCUS VINÍCIUS DIAS SEVERINI

Born:	1957
Appointed:	2017
Other current activities and director or officer positions:	Member of the Audit and Compliance Committee of OceanPact Serviços Marítimos SA. Member of the Audit Committee of Fundação Vale do Rio Doce de Seguridade Social – VALIA
Business experience:	Member of the Fiscal Council of BRF S.A. Member of the Fiscal Council of Mills Serviços e Soluções de Engenharia S.A. Controller of Vale

RAPHAEL MANHÃES MARTINS

MANAGEMENT

Born:	1983
Appointed:	2015
Other current activities and director or officer positions:	Attorney for Faoro Advogados Director of OI S.A. Member of the Fiscal Council of COPEL
Business experience:	Director and Member of the Fiscal Council of companies of Grupo Light S.A. Member of the Fiscal Council of OI S.A. Director of Eternit S.A. Member of the Fiscal Council of companies of the JHSF Participações S.A. Group

MANAGEMENT COMPENSATION

Under our bylaws, our shareholders are responsible for establishing annually the aggregate compensation we pay to the members of our Board of Directors, Board of Executive Officers, Fiscal Council and Board Committees. Once the total compensation has been approved at our annual shareholders' meeting, the Board of Directors, with the support of the People, Compensation and Governance Committee, allocates the compensation among its members and the members of the Board of Executive Officers, Fiscal Council and Board Committees. Compensation proposals and policies are prepared with the support of the People, Compensation and Governance Committee, which makes recommendations to our Board of Directors regarding the annual global compensation of the executive officers.

As a global company, we require management with a deep knowledge of our business and market and unlimited dedication. Attracting and retaining talent, and engaging and motivating the professionals holding strategic positions, especially our executive officers, is critical for our success.

The compensation proposals are based on benchmarking against the compensation policies and practices of the top global mining companies and large global companies in other similar industries, and various other factors, such as the directors' and officers' responsibilities, time devoted to their duties, professional competence and reputation, market practices in the places where we operate, and the alignment of short- and long-term strategies, shareholder returns and the sustainability of the business.

In 2020, we implemented a number of improvements to our Compensation Policy with respect to the compensation of our executive officers, including (a) an increased focus on ESG matters, with impacts on compensation, (b) a more robust process of evaluating the individual performance of executive officers with compensation impacts, (c) a new governance model for the approval of compensation matters, (d) discussions on cultural transformation and human capital and (e) a comprehensive action plan involving relevant and significant improvements in the compensation of executive officers for 2021.

In 2021, relevant and significant improvements in the executive compensation were implemented, such as (a) the inclusion of clawback clauses, (b) the review of benefits and severance packages, (c) changes in the organizational structure, with new executive officers positions, (d) the early renewal process of contracts, and (e) the increase in the long-term incentive portion of the compensation of the executive officers.

EXECUTIVE OFFICERS

2021 Compensation Reporting

As of December 31, 2021, we had eleven executive officers: the Chief Executive Officer and ten Vice-Presidents (nine executive officers and the Chief Executive Officer of Vale Canada who is an employee of Vale Canada). For the year ended December 31, 2021, including severance payments made to former executive officers, the average annual compensation paid to our executive officers was R\$21.39 million, the highest annual compensation paid to an executive officer was R\$55.14 million and the lowest annual compensation was R\$11.31 million, in each case net of taxes. The average annual compensation corresponds to the total aggregate compensation paid to executives in 2021 divided by the monthly average number of active officers that received compensation during the year. The monthly average number of active officers that received compensation during 2021 was 8.61.

For the year ended December 31, 2021, the total payments related to executive officers' compensation packages is set forth in the table below.

	For the year ended December 31, 2021
	<i>(R\$ million)</i>
Annual fixed compensation	26.72
In-kind benefits and pension plans	6.64
Variable compensation	120.40
Other expenses ⁽¹⁾	12.69
Total amount paid in 2021 to active executive officers	166.45
Severance	17.76
Total amount paid in 2021 to active and former executive officers	184.21
Social security contributions on the compensation packages to active and former executives	62.28
Total expenditures related to executive officers' compensation packages	246.49

(1) Additional compensation (spot payments) related to attraction, retention and incentives for deliveries and initiatives relevant to the company, according to Vale's Executive Compensation Policy

Principles and components of executive's compensation policy

The executive compensation is based on the principles below:

- Align executives' priorities and efforts with shareholders' vision, constantly striving for balance in stakeholder relations.
- Leverage and reward value creation and sustainable results, with a long-term perspective, considering our vision to lead the transition to a low carbon economy, generating social progress and respect for the environment.
- Strengthen meritocracy and other forms of performance enhancement, balanced with good management and mitigation of business risks.
- Align our compensation practices to the best international governances' practices.
- Promote clarity and simplicity.
- Provide competitive compensation to attract and retain highly skilled executives in the global talent market under appropriate compensation levels pursuant to market practices.

The total compensation for executives is composed by (i) Fixed Compensation, (ii) Short Term Incentive - Bonus, (iii) Long Term Incentives - Matching and PSU and (iv) Private Pension and Benefits standards based on the local market. Additionally, the executives may be individually entitled to additional compensation pursuant to exceptional arrangements approved by the Board of Directors.

The executive's compensation also includes a severance package to be paid after contract termination.

Fixed compensation

Fixed compensation and in-kind benefits include a base salary in cash, paid on a monthly basis, reimbursement for certain investments in private pension plans, health care, relocation expenses, meal allowance, life insurance, driver and car expenses. In addition, we contribute to private pension plans in an amount of up to 9% of their fixed compensation either to Vale's private pension plan, Valia – Fundação Vale do Rio Doce de Seguridade Social, or to other supplementary pension plan of the choice of the executive officers.

Variable compensation - Short and Long Terms Incentives

Variable compensation consists of: (i) Short Term Incentive – Bonus, based on specific goals for each executive officer and collective goals, all approved by our Board of Directors, and (ii) payments tied to the performance of our shares under two Long Term Incentives programs, the Matching Program and the PSU.

Short Term Incentive - Bonus:

- The short-term variable compensation component is based on collective goals and specific goals for each executive, taking into account economic and financial goals that reflect operating performance, as well as ESG-driven performance goals, directly related to health, safety, risk management and sustainability targets, and other goals related to strategic initiatives such as cultural transformation.
- In the last years, short-term compensation, besides being in line with our ambition to be a leader in low-carbon mining, has included a Risk Management element for all executives and employees, directly connecting it to our goals associated with Health, Safety, Sustainability and Risk Management.
- In 2021, collective goals of Productivity, Vale Production System (VPS) and Cultural Transformation were extended to executives and all senior leadership. Executives working for Security and Risk areas no longer have financial goals, in order to increase focus on health and safety initiatives.
- In addition, in 2021, the indicator EBITDA-IC (current investments) without adjustments was removed from the executive's scorecard.

Long Term Incentive – Matching

- Under the 2021 Matching Program, the Board of Executive Officers shall purchase a certain number of shares or ADRs in the market within a purchase window through the plan administrator. At the end of a three-year cycle, participants are entitled to receive a reward, in shares/ADRs, based on the number of shares or ADRs held through the end of the cycle.
- Participation is mandatory for the Board of Executive Officers in the years in which we pay enough cash bonuses. They cannot sell or transfer their shares or ADRs at any time during the vesting period and must observe the Securities Trading Policy in order to sell or transfer Matching Program shares after the vesting period.
- The program also includes the payment, during the cycle, of “virtual dividends” of the same net value per share that is distributed to shareholders upon payment of dividends and interest on equity.

Long Term Incentive - PSU

- Under the 2021 PSU program, the executive officers receive payments is tied to our performance, based on: (1) our Total Shareholder Return (TSR) indicator compared to a preselected group of mining companies, during the three-year cliff vesting period and (2) the achievement of long-term ESG targets related to health and safety, clean and renewable energy in our electricity matrix, recovery and protection of degraded areas, reduction of specific use of new water, reduction of gas emissions and elimination of the main ESG gaps in relation to market best practices.
- The PSU performance condition currently has the following composition, and is under review for the cycles starting on 2022:
 - 80% TSR (our TSR vs peer group companies' TSR, during the cycle period);
 - 10% Health & Safety (high potential recordable injuries);
 - 10% Sustainability (related to long-term goals in accordance with our 2030 strategy, considering the pillars of climate change, energy, water, forest and ESG gaps)
- For cycles starting from 2021, PSU will be rewarded in shares/ADRs (instead of payment in cash linked to the share price) and will include the payment, at the end of each cycle, of “virtual dividends” of the same net value per share that is distributed to shareholders upon payment of dividends/interest on shareholder's equity to the market during the cycles.
- Since 2019, a stock ownership guidelines (SOG) requisite has been introduced, requiring executives to accumulate (through the share-based compensation programs) and maintain ownership of our shares, in an

amount equivalent to at least 36 times the monthly fixed compensation for the CEO and 24 times the monthly fixed compensation for other executive officers.

As such, a large portion of the executive compensation package is at risk, and the mix offered can vary according to the performance achieved and the return to our shareholders (pay-for-performance) in each year.

Severance package

Our severance packages for qualified terminations may comprise: (i) a lump-sum severance payment, that may vary up to one-half the annual fixed compensation for executive officers and up to the annual fixed compensation for the CEO, paid shortly after the termination date; (ii) a potential non-compete agreement compensation, that may vary up to the annual fixed compensation, to be paid in equal quarterly installments after termination; (iii) payment of any long-term variable compensation grants (Matching and PSU programs), in the vesting of each current cycle; and (iv) payment of any short-term incentive plan (bonus), to be paid in April following the termination date. Severance expenditures in 2021 were related to two former executive officers who left the company in 2019, and 2020.

Other benefits and payments

Pension, retirement or similar benefits consist of our contributions to Valia, the manager of the pension plans sponsored by us.

Social security contributions are mandatory contributions we are required to make to the Brazilian government for our executive officers.

BOARD OF DIRECTORS

As of December 31, 2021, our Board of Directors had 13 members. For the year ended December 31, 2021, the average annual compensation paid to the members of our Board of Directors was R\$1.18 million, the highest annual compensation paid to a member of the Board of Directors was R\$2.04 million and the lowest annual compensation was R\$0.76 million. The monthly average number of members that received compensation during 2020 was 13.25.

In 2021, we paid R\$15.7 million in aggregate to the members of our Board of Directors for services in all capacities, all of which was fixed compensation. There are no pension, retirement or similar benefits for the members of our Board of Directors. We have also entered into indemnification agreements with our directors. The numbers above do not include social security taxes.

As of December 31, 2021, the total number of common shares owned by our Board of Directors was 98,197 and by executive officers was 1,761,963. None of our directors or executive officers beneficially owns 1% or more of any class of our shares.

FISCAL COUNCIL

As of December 31, 2021, our Fiscal Council had five members. We paid an aggregate of R\$1.6 million to members of the Fiscal Council in 2021. In addition, the members of the Fiscal Council are reimbursed for travel expenses related to the performance of their functions. The numbers above do not include social security taxes.

BOARD COMMITTEES

We paid an aggregate of R\$7.8 million to members of our permanent advisory committees in 2021. Directors who participate in advisory committees are entitled to receive, in addition to the compensation as a board member, compensation for participating in one or more committees. In 2021, we paid an aggregate of R\$4.4 million to the

committee members that are also members of our Board of Directors and R\$3.3 million to other committee members. In addition, we paid an aggregate of R\$2.2 million to members of our independent ad hoc advisory committees in 2021. Members of our advisory committees are also reimbursed for travel expenses related to the performance of their duties. The numbers above do not include social security taxes.

EMPLOYEES

The following tables set forth the number of our employees (total, by groups based on the activity performed and by geographic location) as of the dates indicated.

By business:	As of December 31,		
	2021(1)	2020(1)	2019(1)
Ferrous minerals	44,235	44,342	42,077
Coal	5,492	3,320	2,927
Base metals	12,903	13,762	13,738
Fertilizer nutrients(1)	-	-	-
Energy(2)	-	3,954	3,809
Corporate activities	9,636	8,938	8,598
Total	72,266	74,316	71,149

(1) Discontinued operations.

(2) Consists of Biopalma employees.

By location:	As of December 31,		
	2021(1)	2020(1)	2019(1)
South America	153	58,439	55,641
Brazil	55,067	58,249	55,439
North America	6,448	6,169	6,082
Europe	279	293	308
Asia	4,382	4,454	4,455
Oceania	10	1,263	1,384
Africa	5,927	3,698	3,279
Total	72,266	74,316	71,149

(1) Since January 2017, we include in our total workforce figures all fixed-term contract employees, trainees and employees hired through our affirmative action program for Persons with Disabilities.

We negotiate wages and benefits with a large number of unions worldwide that represent our employees. We have collective agreements with unionized employees at our operations in Brazil, Canada, Indonesia, Malawi, Mozambique, and Oman.

The following tables set forth the number of third-party employees (total, by groups based on the activity performed and by geographic location) as of the dates indicated.

By business:	As of December 31,		
	2021(1)	2020(1)	2019(1)
Ferrous minerals	46,327	34,042	27,749
Base metals	15,207	10,395	10,828
Coal	7,416	6,076	5,900
Others(1)	72,197	61,408	33,666
Total	141,147	111,921	78,143

(1) Corporate Services and Biopalma.

By location:	As of December 31,		
	2021 ⁽³⁾	2020	2019
Brazil	114,757	90,877	57,388
Canada	4,311	4,617	3,892
Indonesia	7,515	6,499	5,657

New Caledonia	0	192	1.081
Australia	6	6	1
Mozambique	11.085	8.016	8.731
Others ⁽²⁾	3.473	1.714	1.393
Total	141.147	111.921	78.143

(2) Chile, Japan, Malawi, Malaysia, Oman, Peru, UK, Singapore, Switzerland, mainland China and Taiwan.

(3) In 2021, Vale concludes the sale of Vale Nova Caledônia to Prony Resources

In 2020, there was a 43% growth in the total number of third-party employees, due to the works carried out by the Repair Department, an increase in the portfolio of current projects, the resumption of works in 2020 after the stoppage given the pandemic scenario and the inclusion of third parties associated with service level hires. Data relating to outsourcing was not reported in previous years, considering only permanent and project data from third parties. In 2021, there was a 26% growth in the total number of third-party employees, as a result of repair works, the increase in the current project portfolio and the resumption of works in 2021 following suspensions as a result of the COVID-19 pandemic.

WAGES AND BENEFITS

Wages and benefits for Vale and its subsidiaries are generally established on a company-by-company basis. Our benefits policy is aligned with our attraction and retention strategy, in accordance with applicable laws and market practice in the countries where we operate. We provide an attractive and competitive benefits package ensuring health, well-being, protection and life quality. Among the main benefits offered are medical and dental assistance, life insurance, private pension plans and short-and long-term disability benefits.

We establish our wage and benefits programs for Vale S.A. and its subsidiaries, other than Vale Canada. In November 2021, we reached a one-year agreement with all Brazilian unions providing for a salary increase of 8.8%. The provisions of our collective bargaining agreements with unions also apply to our non-unionized employees.

Vale Canada also establishes wages and benefits for its unionized employees through collective bargaining agreements. In 2021, collective bargaining took place with three of the unions with hourly employees in Port Colborne and office, clerical and technical employees in Sudbury renewing their respective collective agreements without labor disruption. We had a two-month labor disruption in connection with reaching a renewal collective agreement with hourly employees in Sudbury. For non-unionized employees, Vale Canada undertakes an annual review of salaries and benefits. We provide these employees and their dependents with other benefits, including a flexible health care benefit plan.

PENSION PLANS

Brazilian employees of Vale and of most of its Brazilian subsidiaries are eligible to participate in pension plans managed by Valia. Most of the participants in plans held by Valia are participants in a plan named "Vale Mais," which Valia implemented in 2000. This plan is primarily a defined contribution plan with a defined benefit feature relating to service prior to 2000 and another defined benefit feature to cover temporary or permanent disability, pension and financial protection to dependents in case of death. Valia also operates a defined benefit plan, closed to new participants since May 2000, with benefits based on years of service, salary and social security benefits. This plan covers retired participants and their beneficiaries, as well as a relatively small number of employees that declined to transfer from the old plan to the "Vale Mais" plan when it was established in May 2000.

Most employees within our Base Metals operations participate in defined benefit pension plans and defined contribution pension plans. The defined benefit plans have been closed to new participants since 2009, and most new employees within our Base Metals operations are eligible to participate in defined contribution pension plans.

PERFORMANCE-BASED COMPENSATION

All Vale parent-company employees may receive incentive compensation each year in an amount based on the performance of Vale, which can range from 0 to 200% of a market-based reference amount, depending on certain targets set, and the cash generation in each period. Similar incentive compensation arrangements are in place at our subsidiaries.

Qualifying management personnel are eligible to participate in the PSU and Matching Program. See description of these programs under *Management and Employees—Management compensation—Executive officers*.

VI. ADDITIONAL INFORMATION

LEGAL PROCEEDINGS

We and our subsidiaries are defendants in numerous legal actions in the ordinary course of business, including civil, administrative, tax and labor proceedings. The most significant proceedings are discussed below. Except as otherwise noted below, the amounts claimed, and the amounts of our provisions are stated as of December 31, 2021. See note 28 to our consolidated financial statements for further information.

LEGAL PROCEEDINGS RELATED TO DAM RUPTURE IN BRUMADINHO

We are engaged in several investigations and legal proceedings relating to dam rupture in Brumadinho, and other investigations and legal proceeding may be brought in the future. We have been actively seeking non-judicial alternatives to promote a more expedited reparation and remediation to the victims and to settle the various legal proceedings relating to the dam rupture. We reinforce our commitment to fair, swift and equitable reparation of all the affected parties, and will vigorously contest proceedings we believe are without merit.

a) Integral Reparation Agreement and other settlement agreements.

On February 4, 2021, we entered into the Integral Reparation Agreement with the Government of the State of Minas Gerais, the Public Defender Office of the State of Minas Gerais (*Defensoria Pública de Minas Gerais*), public prosecutors of the State of Minas Gerais (*Ministério Público do Estado de Minas Gerais*—“MPMG”) and federal prosecutors (*Ministério Público Federal*—“MPF”) for the reparation and remediation of environmental and social damages resulting from the dam rupture.

Pursuant to this agreement, we settled the claims for socio-economic and socio-environmental damages brought by the State of Minas Gerais and the MPMG under public civil actions before the 2nd Public Treasury Court in the city of Belo Horizonte. Under these public civil actions, the authorities were claiming economic and environmental damages resulting from the dam rupture and sought a broad range of injunctions ordering us to take specific remediation and reparation actions. In July 2019, the court decided that we are liable for the damages caused by the dam rupture, and the Integral Reparation Agreement settled the quantification of damages. The Integral Reparation Agreement does not cover claims for individual damages and any unknown, future and subsequent damages (*danos desconhecidos, futuros e supervenientes*).

We have also entered into other settlement agreements with public authorities to establish frameworks for individual indemnification of the victims. An affected party or a group of affected parties has the option to pursue individual claims against us directly, or to settle its claims under an expedited out-of-court settlement process based on the framework we agreed with the authorities under these other settlement agreements. These other settlement agreements settled certain other judicial proceedings brought against us by public authorities. See *Overview—Business overview— Responses to the rupture of the tailings dam in Brumadinho*.

b) Public civil action and investigation under the Brazilian Anticorruption Law

We are a defendant in a public civil action brought by the MPMG against us, initially filed before a state court in the city of Brumadinho, claiming that we had concealed relevant information about the stability of the Brumadinho dam by presenting a false declaration of stability prior to the Brumadinho dam rupture. The MPMG alleges that this has adversely affected oversight by public authorities concerning the stability of the dam and allegedly allowed us to omit relevant information about the dam and its risks. The MPMG claims that this alleged conduct comprises interference with the oversight of public authorities that is prohibited under the Brazilian Anticorruption Law (Federal Law No. 12,846/2013), and seeks payment of fine and other sanctions.

In January 2021, the court in the city of Brumadinho declared that it had no jurisdiction over the case, and in June 2021 it sent the case records to the 1st Public Treasury Court in the city of Belo Horizonte. The MPMG has appealed and a decision is pending.

In August 2021, the 1st Public Treasury Court dismissed the preliminary injunction that had been granted by the Brumadinho court in May 2021, cancelling the decision that had determined that we posted a bond of approximately R\$7.9 billion. In September 2021, the MPMG appealed and a decision is still pending by the Court of Appeals of the State of Minas Gerais. This legal proceeding is ongoing, and it is not possible at this time to determine a range of outcomes or to make reliable estimates of the potential exposure. We will continue to vigorously contest this action, which we believe is without merit.

In addition to the public civil action, we are being investigated by state and federal public authorities for alleged violations under the Brazilian Anticorruption Law in connection with inspection and monitoring activities of public authorities relating to the Brumadinho dam.

c) Putative class action in the United States

We and certain of our current and former executive officers have been named defendants in putative securities class action suits, under U.S. federal securities laws, brought before federal courts in New York by holders of our securities. These complaints were consolidated through an amended complaint brought by the lead plaintiff in October 2019 before the United States District Court for the Eastern District of New York, captioned *In re: Vale S.A. Securities Litigation*, No. 19 Civ. 526 (RJD) (E.D.N.Y.). The lead plaintiff alleges that we made false and misleading statements or omitted to make disclosures concerning the risks of the operations of the Brumadinho dam and the adequacy of the related programs and procedures. The lead plaintiff has not specified an amount of alleged damages in the action.

In May 2020, our motion to dismiss was denied by the United States District Court for the Eastern District of New York. The proceeding is now in the discovery phase.

In November 2021, seven related investment funds and their advisor affiliated with a privately owned asset manager (all of whom are currently part to the putative class discussed above) filed an “opt-out” complaint that essentially mirrors the putative class action complaint in all material respects. No defendants have been served in this new action, captioned *Orbis Global Equity LE Fund (Australia Registered) et al. v. Vale S.A. et al.*, No. 21 Civ. 6590 (E.D.N.Y.), and no case discovery plan or schedule has been determined.

Given the preliminary status of the actions, it is not possible at this time to determine a range of outcomes or to make reliable estimates of the potential exposure. We will vigorously contest these claims.

d) Criminal proceedings and investigations

In January 2020, the MPMG brought criminal charges against 16 individuals (including former executive officers of Vale and current and former employees) for a number of potential crimes, including homicide, and against Vale S.A. for alleged environmental crimes. These charges were accepted by the state criminal judge in the city of Brumadinho on February 14, 2020. In October 2021, the STJ annulled the decisions rendered by the state courts on the basis that the facts had to be tried by federal courts, and not state courts. The MPMG has appealed to the STF. The MPF has not ratified the criminal charges that had been brought by the MPMG, and as of March 17, 2022 there are no criminal actions pending trial under this proceeding.

In September 2019, the federal police concluded an investigation on potential fraud and forgery of documents in connection with the certification of stability of the Brumadinho dam prior to the dam rupture, and recommended that the MPF bring criminal actions against us and some of our employees. In November 2021, the federal police concluded an investigation on potential criminal liability for the Brumadinho dam rupture. Case records from both investigations have been sent to the MPF. The MPF has not yet concluded the investigations, which may result in new criminal proceedings.

e) Public civil actions brought by labor unions

We are a defendant in public civil actions brought by labor unions before a labor court in the city of Betim, Minas Gerais, claiming that such unions are the legitimate parties to defend the interest of certain employees and outsourced workers affiliated with the union and who were victims of the dam rupture. The unions request compensation payments ranging from R\$1.5 to R\$3 million for each deceased worker. The plaintiffs in one of the public civil actions also requested the attachment of R\$471.6 million in our bank accounts. This preliminary injunction has been dismissed by the lower court. The court has also issued an initial decision ordering us to pay R\$1 million per deceased worker. We have appealed the decisions and will continue to vigorously contest, these actions, which we believe are without merit.

f) Investigations by the CVM and the SEC

We have been notified that the SEC staff has made a preliminary determination to recommend that the SEC commence proceedings against us alleging violations of U.S. securities laws related to our disclosures about our dam safety management and the dam at Brumadinho. If the SEC authorizes an action against us, the SEC could seek an injunction against future violations of U.S. federal securities laws, the imposition of civil monetary penalties, disgorgement and other relief within the SEC's authority in a lawsuit filed in a federal court. The CVM is also conducting investigations relating to our disclosure of relevant information to shareholders, investors and the market in general, especially regarding the conditions and management of our dams. At this time, it is not yet possible to estimate the value or a range of potential loss to the company.

g) Public civil action brought by federal prosecutors regarding our internal policies

We are a defendant in a public civil action brought by the MPF before the 14th Federal Court in the city of Belo Horizonte against us, the ANM and the CVM, requesting a judicial intervention on us, until we restructure and improve our internal policies relating to safety and prevention of disasters. The MPF claims that the court appoint a supervisor reporting directly to the court and with managing powers to report any pattern of behavior within Vale that would suggest contempt or carelessness towards environmental or human risks related to mining activities. The MPF has also requested an injunction to suspend the distribution of our dividends. In November 2020, the ANM, the CVM and we presented defenses, asserting that the injunction and final request are unreasonable, since we have heavily invested in safety and disaster prevention, including with the implementation of new processes and committees. On March 5, 2021, the court dismissed the action, holding that the intervention requested by the MPF in the management and risk assessment of a company would be inadmissible. On April 29, 2021, the MPF appealed this decision. We, the ANM and the CVM filed a response to the appeal, and a decision on such response is still pending. We will continue to vigorously contest this action, which we believe is without merit.

h) Arbitration proceedings in Brazil filed by shareholders, a class association and foreign investment funds

We are a defendant in six arbitrations that have been filed before the arbitration chamber of B3 by: (i) 385 minority shareholders, (ii) a class association allegedly representing our minority shareholders, and (iii) foreign investment funds. In these six proceedings, the plaintiffs allege that we were aware of the risks associated with the Brumadinho dam, and failed to disclose it to the shareholders, which would be required under the Brazilian applicable laws and the rules of the CVM. Based on such argument, plaintiffs claim compensation for losses caused by the decrease in the value of our shares. In one of the proceedings filed by foreign funds, plaintiffs estimated the amount of the alleged losses to be approximately R\$1.8 billion. In the other proceeding by foreign funds, plaintiffs estimated the amount of the alleged losses to be approximately R\$3.9 billion. We disagree with these alleged estimated losses, and believe that the claim is without merit. These proceedings are in early stages, and we will vigorously contest them.

i) Public civil actions relating to evacuation of communities

We are defendants in three public civil actions brought by the MPMG against us claiming a number of injunction reliefs and socioeconomic damages resulting from the evacuation of communities located in the self-rescue zones of certain

of our dams located in Ouro Preto, Nova Lima and Barão de Cocais. Pursuant to settlement agreements celebrated or court decisions, we are required to make monthly emergency payments, and fund temporary housing, transportation, medicines, among other measures, to the affected individuals. In addition to the emergency payments and related measures, prosecutors claim substantial amounts of socioeconomic damages. These lawsuits are still in progress.

On October 22, 2021, public prosecutors initiated a civil investigation, on the basis that we have allegedly violated or threatened to violate individual and collective human rights in its relations with the communities and the affected people in the city of Barão de Cocais, state of Minas Gerais, after the evacuation resulting from the elevation of the emergency level of Sul Superior dam, in the Gongo Soco Mining Complex. We have provided the information requested by the authorities, refuting the allegations, and we are currently awaiting new developments.

On January 26, 2022, the MPF filed a request for a provisional remedy against us, requesting that we present a temporary relocation plan for the indigenous community Pataxó, Pataxó Hã Hãe, especially the Naô Xohã Village, and provide a monthly payments of installation and maintenance allowance to the relocated families. On February 17, 2022, the federal court in the city of Belo Horizonte granted an injunction ordering the temporary relocation of the indigenous community Pataxó, Pataxó Hã Hãe, and the provision of monthly payments by us until definitive settlement of the community. We will contest this lawsuit, which we believe is without merits.

j) Lawsuit brought by the municipality of Brumadinho

On December 2, 2021, the municipality of Brumadinho filed an action against us before the state court in Brumadinho, requesting compensation for property and extra-patrimonial damages suffered by the municipality, as well as and moral damages. The municipality also requested in a preliminary injunction which is pending of judgment, the attachment of assets in the amount of R\$5 billion, as well as monthly payments of approximately R\$3.7 million to compensate alleged financial losses due to the drop in tax revenues following the rupture of the Brumadinho dam. On February 3, 2022, we filed a response on this proceeding, and a decision is still pending. We will continue to vigorously challenge this action, which we believe is without merit.

k) Other proceedings

We are a defendant in a number of investigations and proceedings brought by individuals, business entities, investors, associations, unions, legislative bodies, non-governmental organizations and other entities seeking remediation and compensation for environmental, property and personal damages resulting from the Brumadinho dam failure, including alleged violations of securities laws. These investigations and proceedings include requests for significant amounts in damages, injunctions, pre-judgment attachment of assets and seizure of our bank accounts. Most of them are in early stages, and we cannot reasonably estimate their impact. Other investigations, arbitrations and proceedings relating to the rupture of the tailings dam in Brumadinho may be brought in the future.

LEGAL PROCEEDINGS RELATED TO THE RUPTURE OF SAMARCO'S TAILINGS DAM

We are engaged in several legal proceedings relating to the rupture of Samarco's tailings dam in the city of Mariana, in the state of Minas Gerais.

a) Public civil action brought by federal prosecutors and framework agreements

We are a defendant in several legal proceedings brought by governmental authorities and civil associations claiming socioenvironmental and socioeconomic damages and a number of specific remediation measures as a result of the rupture of Samarco's Fundão dam. Following a decision of the Superior Court of Justice (*Superior Tribunal de Justiça*—“STJ”), these proceedings were consolidated before the 12th Federal Court of Belo Horizonte. The two main proceedings were (i) the public civil action brought by the states of Minas Gerais and Espírito Santo, certain federal and state authorities and certain public entities in November 2015 and (ii) the public civil action brought by the MPF in March 2016.

We have entered into two main settlement agreements with the authorities for reparation and remediation of the damages resulting from the rupture of Fundão dam.

- In March 2016, we, together with Samarco and BHPB, entered into a framework agreement with the federal government, the state governments of Espírito Santo and Minas Gerais and certain other federal and state authorities (the “Framework Agreement” or *Termo de Transação e Ajustamento de Conduta - TTAC*). Under the Framework Agreement, Samarco, BHPB and Vale created Fundação Renova, an independent foundation to implement reparation and remediation of damages resulting from the rupture of Fundão dam. The Framework Agreement established 42 socioenvironmental and socioeconomic programs in the region impacted by the Fundão dam breach, and created a governance mechanism for implementation. The agreement has a 15-year term, renewable for successive one-year periods until all the obligations thereunder have been performed.
- In June 2018, Vale, Samarco, BHPB, the MPF, state prosecutors, public defenders and attorneys general, among other parties entered into another framework agreement to improve the governance mechanism of Fundação Renova and establish a process for potential revisions to the remediation programs provided under the Framework Agreement and establishing, among other things, a process for potential revisions to the remediation programs provided under the Framework Agreement based on the findings of experts to be hired by Samarco to advise the MPF (the “June 2018 Agreement” or *Termo de Ajuste de Conduta - TAC Governança*). The June 2018 Agreement terminated certain lawsuits, including public civil actions that had been filed by the Brazilian federal government and the states of Minas Gerais and Espírito Santo, and contemplates the future termination of other public civil actions upon agreement over the remediation programs that are current under review by experts.
- In January 2020, at the request of the parties, the 12th Federal Court authorized the commencement of specific collateral proceedings to address certain topics considered priority and that were not resolved through the governance mechanisms of the framework agreements. For each of these priority topics, the court established specific obligations to be met by public authorities, Fundação Renova, Vale, Samarco and BHPB.

As part of one of these proceedings, in August 2020, the court approved the “*Agenda Integrada*” program, a settlement agreement among Fundação Renova, the states of Minas Gerais and Espírito Santo and an association of mayors of cities along the Doce river, providing for the allocation of approximately R\$882 million to investments in education, infrastructure, and health in the region impacted by the rupture of the Samarco dam.

In a specific proceeding, the court issued in July 2020 a decision providing guidelines for compensations to be paid to residents of the city of Baixo Guandu, followed by other decisions setting simplified parameters for the compensation of workers (mainly informal workers whose activities are difficult to prove), in at least 35 cities and villages in the states of Minas Gerais and Espírito Santo. These parameters have been reflected throughout other cities along the Doce river, following a court decision issued on October 30, 2021. As of December 31, 2021, 51,202 people had received payments in the states of Minas Gerais and Espírito Santo through this new simplified compensation mechanism. In October 2020, the MPF sought the annulment of the decisions that recognized the new simplified system. The Court of Appeals rejected the MPF’s request for preliminary injunction, but a decision on the merits of the request is still pending.

Recent court decisions have also determined the inclusion of new categories as eligible for compensation, as well as municipalities not covered for in the Framework Agreement, also expanding the system to the territory of Mariana, which already has its own indemnity matrix, agreed upon in the Public Civil Action filed by Minas Gerais State’s Public Attorney’s Office. Another decision also determined the payment of compensation for the temporary water deprivation caused by the rupture of the dam, as well as the possibility for people who were indemnified by Fundação Renova to submit claims for complementary indemnity based on the new simplified compensation mechanism. We have appealed and a decision is pending.

In October 2020, the MPF required the resumption of the public civil action due to a deadlock in the engagement of experts to assist the MPF in the review of the existing programs, as contemplated in the June 2018 Agreement. Due to the negotiations mediated by the National Council of Justice, the request has yet to be reviewed by the 12th Federal Court. In July 2021, the MPF requested a new suspension of the proceedings to allow for the continuation of extrajudicial negotiations. The Framework Agreement provided for a possibility of renegotiation of the Fundação Renova’s reparation programs upon the completion of studies conducted by specialist engaged by the Public

Prosecutor's Office. The negotiations began in April 2021, and in June 2021 a letter of principles was signed by the companies BHP, and Samarco and us, as well as by representatives of the Public Prosecutor's Office and other authorities involved. Discussions regarding the renegotiation are still ongoing.

On February 24, 2021, public prosecutors of the State of Minas Gerais (*Ministério Público do Estado de Minas Gerais*—"MPMG") filed a public civil action against Samarco, BHPB, Fundação Renova, and us, claiming moral damages in the amount of R\$10 billion and requesting an injunction for a judicial intervention on Fundação Renova and, after a transition period, the extinction of Fundação Renova. These requests are based on allegations by the prosecutors of Renova's lack of independence and autonomy, breach of the Framework Agreement and misuse of powers. The injunction has been denied by the court and we will continue to vigorously contest this action, which we believe has no merit. The proceeding is currently suspended, due to a conflict with another proceeding relating to a potential restructuring of Fundação Renova's Internal Organization Management System.

In May 2021, the MPMG filed a public civil action against Renova, Samarco, BHP and us, claiming that Fundação Renova was deviating from its purpose and promoting false advertising, in an attempt to deceive those affected. These claims have been contested by the companies and the proceeding was suspended in view of the negotiations among the parties, mediated by the National Council of Justice. A preliminary injunction by the MPF in this case has already been denied by the court.

In October 2021, the MPMG initiated a proceeding seeking compensation of approximately R\$2.5 billion from Samarco, BHP and us, alleging that the companies have not fulfilled the obligations set forth in the June 2018 Agreement that established a process for indemnifying people affected in the city of Mariana. We objected and will continue to vigorously contest this action, which we believe is without merit.

b) Criminal proceeding

In October 2016, the MPF filed criminal charges before the federal court of Ponte Nova, state of Minas Gerais, against us (Vale S.A.), certain of our employees and a former officer, among other corporate and individual defendants. The court has dismissed part of these charges, but accepted charges of environmental crimes against Vale S.A. and one of our employees relating to an alleged omission in the provision of relevant information of environmental interest, false statements and fraud in a public filing, in connection with the alleged failure to disclose that tailings from our Alegria mine were discharged at the Fundão dam. A criminal proceeding against us and one of our employees is ongoing.

In March 2020, the court scheduled a number of hearings to collect defense witnesses' testimonies, but hearings were suspended due to the COVID-19 pandemic. Certain hearings were held on February and March 2022, and we expect new hearings to be scheduled later this year. We cannot estimate when a final decision on the case will be issued. We will vigorously contest this action. If we are criminally convicted, we may be subject to penalties to be imposed by the court, in the proportion to the environmental damage caused and our responsibility. Potential sanctions include fines, suspension of activities, prohibition from entering into contracts with the public administration, pecuniary obligations to support environmental programs or projects, obligation to remediate environmental damages or maintain public spaces, and obligation to pay compensation to environmental or cultural public entities.

c) Tax proceeding

In September 2018, the federal tax authorities filed a request before a federal court in Belo Horizonte for an order seizing Vale's assets to secure the payment of Samarco's federal tax and social security debts, in the amount of approximately R\$11 billion (as of June 2018). In May 2019, a favorable decision was issued dismissing the claim without prejudice, due to lack of procedural interest. The General Attorney for the National Treasury (*Procuradoria Geral da Fazenda Nacional*—PGFN) filed an appeal to the local court, and a decision is pending.

d) Proceedings to Pierce the Corporate Veil

In the context of the Judicial Reorganization of Samarco, the MPMG and certain financial creditors of Samarco have commenced two proceedings before 2nd State Court for Corporate Matters of the city of Belo Horizonte (Samarco's bankruptcy court) seeking, among other requests, to freeze our assets (in the capacity of shareholder of Samarco), extinguish the Judicial Reorganization, and pierce the corporate veil of Samarco in order to hold its shareholders, including us, liable for Samarco's prepetition debt. Samarco has approximately R\$50 billion in debt subject to judicial reorganization, of which approximately R\$24 billion are owed to its shareholders (BHPB and us). These proceedings are in early stages, and will vigorously contest these claims which we believe are without merit. Both proceedings are still pending judgment by the court. See *Information on the Company—Lines of Business—Other Investments—Other—Samarco*.

e) Other proceedings

We have been named as a defendant in a number of private actions, before different state and federal courts in the states of Minas Gerais and Espírito Santo, brought by individuals, business entities, municipalities and other entities seeking remediation and compensation for environmental, property and personal damages resulting from the Fundação dam rupture. These proceedings include requests for significant amounts in damages, injunctions, pre-judgment attachment of assets and seizure of our bank accounts. We have settled part of these suits, and continue to defend in a number of these proceedings.

Samarco is engaged in several other investigations and proceedings claiming damages resulting from the dam rupture. Immediately after the dam rupture, the environmental authority of the state of Minas Gerais and the DNPM (currently, the ANM) commenced an investigation into the causes of the dam rupture, and ordered the suspension of Samarco's operations pending the conclusion of these investigations.

LEGAL PROCEEDINGS REGARDING SAFETY REQUIREMENTS AT OTHER DAMS

We are involved in a number of other public civil actions in which public prosecutors and other authorities seek to suspend or restrict our operations or obtain injunctions compelling us to implement safety measures at other existing tailings dams. Most of these lawsuits were already dismissed as a consequence of several agreements we entered into with public prosecutors and the state of Minas Gerais, but some are still ongoing.

a) Maravilhas II and III litigation

In October 2017, before the rupture of the Brumadinho dam, public prosecutors of the State of Minas Gerais (*Ministério Público do Estado de Minas Gerais*—"MPMG") brought public civil actions challenging our environmental licenses for the construction of the Maravilhas III tailings dam, which is expected to support our operations in the Vargem Grande mining complex, in our Southern System. After the rupture of the Brumadinho dam, the MPMG filed a request for a preventive injunction seeking to discontinue the project, but the request was rejected by the court. This proceeding is still ongoing. If the construction of this dam is interrupted, our ability to resume operations in the mining complex of Vargem Grande could be adversely impacted.

In October 2018, before the rupture of the Brumadinho dam, the MPMG brought a public civil action related to Maravilhas II and III tailings dam seeking, among others requests, an injunction ordering us to refrain from disposing tailings in such dams. The injunction request was initially granted by the court, but in July 2019 the decision was reversed by the Court of Appeals of the State of Minas Gerais. This proceeding is still ongoing.

In April 2019, the MPMG brought a public civil action related to the Maravilhas II tailings dam, requesting injunctions ordering us to (i) refrain from disposing tailings, operating, constructing or making other interventions on the dam; (ii) refrain from increasing the risks of other structures in the mining complex where Maravilhas II is situated; and (iii) review technical studies and other documents related to the dam, and conduct an external audit on the structure. The injunction requests were granted by the state court of the city of Itabirito. The Maravilhas II tailings dam supports our

operations in the Vargem Grande complex, which had been suspended since February 2019 and have partially resumed. These proceedings were partially dismissed following a settlement agreement signed by the parties in September 2019. No agreement has been reached regarding the prohibition of measures that could potentially increase the risks of the structure, and the proceeding remains ongoing.

b) Forquilha V

In December 2021, the MPMG filed a public civil action requesting an injunction to halt the operations of Forquilha V dam, which is part of the Fabrica mining complex, until the review and approval by the public authorities of a new Emergency Action Plan. The suspension of these activities would severely impact the operation of the Fabrica mining complex. These proceedings are in early stages, and the request is still pending judgement. We will vigorously contest this action, which we believe is without merit.

c) Public Civil Actions in Pará

In March 2022, the labor public prosecutors of the state of Pará filed two public civil actions before the labor court of Marabá and Parauapebas. The prosecutors requested injunctions to require us to adopt several labor safety measures relating to the Mirim and Pera Jusante dams, in the Carajás complex, including in order to prevent all employees that are not strictly necessary to the maintenance and operations of the Mirim and Pera Jusante dams from accessing the Self-Rescue Zone of such dams. In addition to these measures, prosecutors are also requesting R\$295million in damages in each of these actions.

In the public civil action related to the Mirim dam, the court partially granted the injunction, establishing a 60-day deadline for us to remove employees and structures (workshop, gas station etc) from the Self-Rescue Zone (ZAS) and adopt additional dam and labor safety measures. The court has not yet issued a decision on requests for the removal of employees with respect to the long-distance conveyor belt (TCLD) Salobo I, II and III and the secondary crushing plant. If an agreement is not reached or if we are not successful in contesting this action, the enforcement of the decision may have a material impact in our Salobo operations, considering that the impediment to access the ZAS area may lead to the suspension of certain operations.

In the public civil action related to the Pera Jusante dam, the court granted the injunction, establishing a 24-hour deadline for us to remove employees and structures from the Self-Rescue Zone and a 30-day deadline for other safety measures. On April 7, 2022, the Superior Labor Court ordered the suspension of this proceeding until May 2, 2022, while the parties negotiate a potential settlement. If an agreement is not reached, the enforcement of the decision may have a material impact on the operation of the Carajás complex, considering that the impediment to access the ZAS area may lead to the suspension of certain operations.

Both proceedings are in the early stages.

LEGAL PROCEEDINGS SEEKING SUSPENSION OF CERTAIN OPERATIONS IN THE STATE OF PARÁ

Since 2012, the MPF and associations representing indigenous peoples Xikrin do Cateté and Kayapó, located in the state of Pará, have brought various legal proceedings against us seeking monetary compensation and a broad range of injunctive reliefs as a result of alleged irregularities in the licensing process for certain of our operations or alleged impact of our iron ore and base metals mining activities on these communities. These legal proceedings involve our Onça Puma nickel operations, S11D iron ore operations, Salobo copper operations, and Alemão iron project.

- In November 2020, we entered into an agreement with the MPF and associations (the “November 2020 Preliminary Agreement”) pursuant to which we agreed (i) the suspension of all these legal proceedings for one year starting November 2020, while the parties agree on a comprehensive settlement agreement and (ii) the payment of certain amounts for the benefit of the indigenous communities Xikrin and Kayapó, in the amount of approximately R\$26 million during this one-year period. The suspension provided for in the November 2020

Preliminary Agreement was extended for additional six months, starting in November 2021 for the definitive agreement to be concluded.

- In December 2021, we entered into the definitive agreement with the Xikrin community and, in February 2022, we entered into the definitive agreement with the Kayapó community, pursuant to which we agreed to provide certain social and economic compensation to these communities. The agreement with the Xikrin community was approved by the court responsible for the Onça Puma and S11D projects. Approval is still pending for the Salobo, Alemão and Ferro Carajás projects. The Kayapó agreement is still pending approval by the courts. Below is a description of each proceeding.

a) Onça Puma litigation

In 2012, the MPF brought a public civil action against the state of Pará and us, before a federal court in the city of Redenção, seeking the suspension of our nickel operations in Onça Puma, due to the alleged impact on the Xikrin do Cateté and Kayapó indigenous lands located close to the mining site. The MPF contend that (i) our operations would be contaminating the water of the Catete River, which crosses the land of Xikrin do Cateté, (ii) we have failed to comply with certain conditions under our environmental licenses, and (iii) the state of Pará was not competent to grant environmental license to this operation and (iv) request for receipt of royalties.

From September 2017 through June 2019, our mining activities and our nickel processing plant in Onça Puma were suspended as a result of injunctions issued by the Federal Court of Appeals (Tribunal Regional Federal – “TRF”) in favor of the MPF in this proceeding. This injunction was reversed in September 2019 by the Federal Supreme Court (Supremo Tribunal Federal - “STF”), subject to the compliance with certain conditions and the release of certain judicial deposits in favor of the indigenous communities. The proceeding is currently suspended as a result of the November 2020 Preliminary Agreement.

In 2020, the same associations representing the indigenous people of Xikrin do Cateté brought other public civil actions against Vale before the federal court of the municipality of Redenção, seeking the suspension of our nickel operations in Onça Puma, in the state of Pará, based on arguments similar to those made by the MPF in the 2012 public civil action.

The final settlement agreement was signed into with the Xikrin community in December 2021 and approved by the court of the municipality of Redenção in March 2022. The final settlement agreement was signed with the Kayapó community in February 2022 and remains subject to approval by the civil court. We continue to negotiate with the MPF the terms of the environmental compensation and environmental programs in connection with Onça Puma litigation.

b) S11D litigation

In May 2016, associations representing the indigenous community of Xikrin do Cateté brought a public civil action before a federal court in the city of Marabá against Vale, the Federal Environmental Agency (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis - “IBAMA”*), the Federal Indigenous Agency (*Fundação Nacional do Índio - “FUNAI”*) and the National Bank of Economic and Social Development (*Banco Nacional de Desenvolvimento Econômico e Social - “BNDES”*), seeking the suspension of the environmental permitting process of our S11D mine. The associations contend that FUNAI and IBAMA have failed to conduct the appropriate studies regarding the affected indigenous communities during the environmental permitting process, and consequently that the indigenous groups affected by this mine have not provided the required consent. The plaintiffs also requested a monthly payment for each association until the defendants conclude the studies. In January 2017, the court denied plaintiffs’ request for an injunction to suspend our S11D mine.

In 2019, the court partially granted an injunction requested by the Indigenous Associations, ordering Vale and Salobo to prepare the Indigenous Component Study of the S11D, but rejected all other requests filed by the plaintiff, including the request to shut down the project.

The December 2021 settlement agreement was approved by the court of the city of Marabá in April 2022, and the decision issued by the court determined the termination of the S11D litigation.

c) Salobo litigation

In July 2018, associations representing the indigenous community of Xikrin do Cateté brought a class action against Vale, IBAMA and FUNAI before a federal court in the city of Marabá seeking the suspension of the environmental permitting process of our Salobo mine. The associations contend that FUNAI and IBAMA have failed to conduct the appropriate studies regarding the affected indigenous communities during the environmental permitting process and contends that our operations would be contaminating the water of the Itacaiúnas River and consequently that the indigenous groups affected by this mine have not provided the required consent. The plaintiffs also requested a monthly payment for each association until the defendants conclude the studies. In July 2019, the court partially granted an injunction requested by the Indigenous Associations, ordering Vale and Salobo to prepare the Indigenous Component Study of the Salobo Mine project, but rejected all other requests filed by the plaintiff, including the request to shut down the project. A recent decision of the court determined the inclusion of the Indigenous community of Xikrin do Bacajá in the scope of the studies. We have appealed and a decision is pending.

The December 2021 settlement agreement remains subject to approval by the civil court of Marabá. Once approved by the court, this settlement agreement is expected to terminate Salobo litigation.

d) Alemão project litigation

In 2020, associations representing the indigenous community of Xikrin do Cateté brought a public civil action against Vale before a federal court in the city of Marabá, claiming irregularities in the environmental permitting process for our Alemão copper project in the city of Parauapebas, in the state of Pará, and seeking the suspension of the environmental permitting process until we complete an Indigenous Component Study (ICS), which the community contends is required due to the proximity of the future mine to the Xikrin do Cateté indigenous land. Plaintiffs also requested a compensation payment regarding our operations in the Igarapé Bahia Mine, on the basis that we allegedly failed to conduct the relevant studies and implement appropriate mitigation actions. These proceedings are in early stages, in the post-filing phase. We will vigorously contest this action, which we believe is without merit.

The December 2021 settlement agreement remains subject to approval by the civil court of Marabá. Once approved by the court, this settlement agreement is expected to terminate Alemão project litigation.

LEGAL PROCEEDINGS SEEKING CANCELLATION OF LICENSES OR SUSPENSION OF OPERATIONS IN THE STATE OF MINAS GERAIS AND ESPÍRITO SANTO

a) Mar Azul, Tamanduá and Capão Xavier litigation

In June 2020, a civil association that represents owners of properties located in the proximities of the Mar Azul, Tamanduá and Capão Xavier mines brought a public civil action against the state of Minas Gerais, the ANM and us, before a federal court in the state of Minas Gerais, requesting the cancellation of our mining and environmental licenses to operate the Mar Azul, Tamanduá and Capão Xavier mines in our Southern System. Plaintiff also filed for an injunction to suspend such environmental licenses and, consequently, our operations at these mines, alleging, among other matters, that our mining activities at these mines are contaminating water springs in the region. We submitted a response to this request for injunction and the lower court issued a decision declaring the court's lack of jurisdiction and submitted the case to the Belo Horizonte state court. The plaintiff filed an appeal and a decision is pending. We will vigorously contest this action, which we believe is without merit. Our mining operations at the Mar Azul and Tamanduá mines are currently suspended, and the production at the Capão Xavier mine is approximately 6.5 million metric tons on an annual basis.

b) Viga litigation

In September 2020, the municipality of Jeceaba, state of Minas Gerais, filed a public civil action before the local court against us. Under this proceeding, the court has granted an injunction determining that we refrain from (i) disposing

tailings in Dam 7, a tailings dam located at our Viga mine in the Southern System, without the required location and operating permits, and (ii) carrying out works at Dam 7 without the required construction permit. In December 2020, the location and operating permits for Dam 7 were issued in a preliminary decision subject to immediate appeal on a separate claim. In November 2021, we entered into a settlement agreement with the municipality of Jeceaba, ratified by the court, pursuant to which such municipality agreed to issue the required construction permit for Dam 7, partially resolving the civil action's claims, as we now have the required permit to carry out works at Dam 7. The public civil action is still ongoing, regarding the other requests about compensatory measures and safety standards of the structure, as well as compensation claims.

c) Tubarão litigation

In September 2019, a civil association brought a public civil action against us, before a state court in Vitória, state of Espírito Santo, claiming that the licensing process for the expansion of our operations at the Tubarão Complex failed to fulfill formal requirements and consider environmental impacts; and established emission parameters different than the ones that had been set forth in the relevant Environmental Impact Study. In this proceeding, the plaintiff filed for an injunction seeking the suspension of Tubarão Complex operating license. We filed our defense and in October 2020, and the court rejected plaintiff's request for the injunction. The court has also appointed an expert to prepare a technical report.

d) EFVM railroad litigation

In 2021, the General Attorney of the Legislative Assembly of the State of Minas Gerais filed a public civil action before the 13th federal court in Minas Gerais, alleging that the third amendment to the concession agreement of the Vitória a Minas railroad ("EFVM"), that renewed the EFVM concession, is null and void and requesting a preliminary injunction to: (i) suspend the effectiveness of the agreement, or (ii) suspend the rendering of the services by us, until final ruling. In April 2021, there was a decision favorable to us, extinguishing the lawsuit without judgment on the merits. The plaintiff filed an appeal, and a decision is pending. We believe the appeal is without merits.

In 2021, an NGO filed another public civil action against the Federal Government and ANTT before the 15th court in the Minas Gerais, requesting the suspension of effectiveness of the third amendment to the EFVM concession agreement, specifically in relation to the payment of the concession fee, along with the restatement of relevant contractual provisions to convert the fee amount into an investment budget in the railroad.

The plaintiff requested an injunction to suspend the payment of the concession fee in cash, until final ruling, and require that the states of Minas Gerais and Espírito Santo impose new investment obligations under the concession, within a period to be determined by the court; among other requests.

The preliminary injunction was rejected by the court. The plaintiff filed an appeal, and a decision is pending. In May 2021, we filed a petition requesting to be included as a party in the lawsuit which is yet to be analyzed by the court. We will vigorously contest this action, which we believe it is without merits.

e) Lawsuit relating to the Apolo project licensing and de-characterization of B3/B4

In February 2022, a city council official of the city of Belo Horizonte, Minas Gerais, filed a public action asking for (i) the suspension of the licensing process for the Apolo project located in the Minas Centrais complex until the development of a climate impact assessment and (ii) the beginning of the licensing for the de-characterization of the structure located downstream of the B3/B4 dam. Although unrelated, both claims were brought in the same action, based on alleged licensing irregularities and potential impact on water security. We have submitted our defense and will vigorously contest this lawsuit, which we believe is without merits.

ITABIRA SUITS

We are a defendant in two separate actions brought by the municipality of Itabira, in the Brazilian state of Minas Gerais. In the first action (a public civil action), filed in August 1996, the municipality of Itabira alleges that our Itabira iron ore

mining operations have caused environmental and social harm, and claims damages with respect to the alleged environmental degradation of the site of one of our mines, as well as the immediate restoration of the affected ecological complex and the performance of compensatory environmental programs in the region. The damages sought, as adjusted from the date of the claim, amount to approximately R\$8.968 billion. An expert report favorable to us has been issued, but the court granted the municipality's request for additional expert evidence. The preparation of this additional expert evidence is pending and the action is suspended until conclusion.

In the second action, filed in September 1996, the municipality of Itabira claims the right to be reimbursed for expenses it has incurred in connection with public services rendered as a consequence of our mining activities. The damages sought, as adjusted from the date of the claim, amount to approximately R\$8.950 billion. This proceeding was suspended for a settlement negotiation, but has resumed its normal course as the parties have not reached an agreement, and the evidence production phase will follow. We believe these suits are without merits and will continue to vigorously contest them.

MINISTRY OF LABOR PROCEEDING

In February 2015, following an inspection in the facilities of a company that provided transportation services to us between our mines Mina do Pico and Mina de Fábrica in the state of Minas Gerais, the Ministry of Labor determined that this transportation company had failed to comply with certain obligations relating to health, safety, overtime and other labor matters. By adopting a broad interpretation of the law, the Ministry of Labor concluded that its employees were working in conditions similar to slavery. Upon learning of the findings, we promptly remediated the problems and we eventually terminated the agreement with the transportation company. Nevertheless, the Ministry of Labor commenced two administrative proceedings against us, one alleging illegal outsourcing and another alleging that the illegally outsourced employees were working in conditions similar to slavery. In December 2018, the regional labor court upheld our annulment action and confirmed that the outsourcing of the transportation services in this case was lawful. However, in March 2019 the courts confirmed administrative decision that determined that our service provider had employees in conditions similar to slavery. We have appealed this decision and will continue to vigorously contest this action.

OTHER ENVIRONMENTAL CRIMINAL PROCEEDINGS

In May 2020, public prosecutors of the State of Minas Gerais (Ministério Público do Estado de Minas Gerais—"MPMG") presented criminal charges against us and one of our employees alleging that we have committed environmental crimes through an environmental intervention carried out in our mineral development center located in the city of Santa Luzia, state of Minas Gerais, without legal authorization, which led to the suppression of seventy-one tree specimens. The criminal charges were accepted by the court in June 2020, and we submitted our written defenses. We believe this proceeding is without merit and we will vigorously contest this action.

CLAIMS INVOLVING OUR PARTICIPATIVE STOCKHOLDERS' DEBENTURES (*DEBENTURES PARTICIPATIVAS*)

At the time of the first stage of our privatization in 1997, we issued Brazilian law governed debentures known in Brazil as "*debêntures participativas*" to our then-existing shareholders.

Our participative stockholders' debentures are governed by a debenture deed, which provides that premium payments are due once sales volumes at reference assets attain specified thresholds. We have made all payments in compliance with applicable provisions of the debenture deed and the privatization prospectus (*edital*). Certain holders of our participative stockholders' debentures have brought claims against us, alleging that premium payments should have been triggered by production volumes, rather than sales volumes. If successful, these claims would affect the timing of premium payments, and may require us to recognize one-time payments to the claimants based on the initial premium payments that were allegedly owed and not paid. We believe that these claims are meritless, and do not recognize any

obligation to make premium payments prior to the time specifically provided by the debenture deed. We have in the past, and intend to continue to, vigorously defend our position with respect to these claims through all available means.

TAX PROCEEDINGS

We and our subsidiaries are defendants in numerous tax proceedings. The most significant proceedings are discussed below. Except as otherwise noted, the amounts stated below are the total amounts claimed under the proceedings (including remote, possible and probable losses), stated as of December 31, 2021. We recognize provisions for probable losses, for which a reliable estimate can be made, based on reports and technical assessments and on management's assessment. See note 28 to our consolidated financial statements for further information.

a) CFEM-related proceedings

We are engaged in numerous administrative and judicial proceedings related to the mining royalty known as CFEM. For more information about CFEM, see *Information on the Company—Regulatory matters—Royalties and other taxes on mining activities*. These proceedings arise from assessments by the ANM (former "DNPM"), which main discussions involve the deduction of taxes, insurance and transportation costs indicated in the corresponding invoice of CFEM payments, in addition to CFEM charges on pellet sales and the revenues from sales made by our foreign subsidiaries. The aggregate amount claimed in the pending assessments is approximately R\$8.89 billion, including interest and penalties through December 31, 2021.

We are contesting these claims using all the available means under Brazilian law, including challenges in administrative tribunals and in the judicial courts. We have received some favorable and unfavorable decisions, and such decisions have not yet become final.

The ANM's assessments were initially based on the interpretation that the applicable statute of limitation for CFEM claims would be 20 years. We challenged all the assessments, contending that these claims were subject to a 5-year statute of limitation. In December 2015, the Attorney General's Office issued a legal opinion concluding that CFEM claims are subject to a 10-year statute of limitations, consistent with the decisions of the Superior Court of Justice (*Superior Tribunal de Justiça—"STJ"*). The ANM conducted a review of the charges of the deduction of charges that were time barred, in accordance with the opinion of the Attorney General's Office and the allocation of supplemental payments that we made with respect to transportation costs that had not been indicated in the corresponding invoice. We have submitted our manifestation regarding the amounts indicated by ANM.

b) ICMS tax assessments and legal proceedings

We are engaged in several administrative and court proceedings relating to charges of Goods and Services Tax ("ICMS") and corresponding fines by the tax authorities of different Brazilian states. In these proceedings, the main allegations of the tax authorities are: (i) undue tax deduction; (ii) failure to comply with certain accessory obligations; (iii) tax's incidence on the transportation of goods between the same taxpayer's establishments; (iv) incidence of ICMS on electricity purchases, (v) differences of ICMS tax rates (DIFAL), and (vi) ICMS incidence on our own transportation activities. As of December 31, 2021, the aggregate amount claimed in these proceedings was approximately R\$3.73 billion.

Regarding the transportation of the iron ore, the tax authorities of the State of Minas Gerais contend that we should have paid ICMS and corresponding fines. We understand that this activity is not subject to ICMS because the ore is transported by us to our own facilities. In December 2018, the judicial court issued a final decision in our favor concerning the tax assessment covering activities in 2009 and 2010 in an aggregate amount of R\$632 million. Regarding activities occurred in 2011, 2012 and 2013, the approximate amount in dispute is R\$1.1 billion (included in the amount mentioned above). The State of Minas Gerais has filed appeals which are pending judgement in superior courts. We also expect a favorable outcome in this case.

There is a criminal proceeding involving former officers of our subsidiary MBR, alleging the practice of ICMS tax evasion with respect to ore re-sieving activity in MBR port facilities. We have already presented our defense and a decision is pending. We believe that the allegations are without merit.

c) Litigation on Brazilian taxation of foreign subsidiaries

In 2003, we filed for a *writ of mandamus* to prevent Brazilian corporate income tax (*Imposto sobre a Renda das Pessoas Jurídicas*—“IRPJ”) and social contributions on the net income (*Contribuição Social sobre o Lucro Líquido*—“CSLL”) taxation on the profits of our non-Brazilian subsidiaries and affiliates.

The Brazilian Federal Government has filed various administrative and judicial proceedings against us claiming that we must pay IRPJ and CSLL on the profits of our non-Brazilian subsidiaries and affiliates in relation to the 1996 and 2008 fiscal years.

In 2013, we significantly reduced the amount in dispute by participating in the REFIS-TBU, a federal tax settlement program for payment of amounts relating to IRPJ and CSLL on profits of subsidiaries abroad from 2003 to 2012 fiscal years. Under the REFIS-TBU, we paid R\$5.9 billion in 2013, and we have been paying the remaining R\$16.3 billion in monthly installments, bearing interest at the SELIC rate. SELIC is a variable interest rate, established by the Brazilian central bank, used to update federal tax obligations in Brazil. As of December 31, 2021, the remaining balance was R\$12.36 billion, to be paid in 82 further installments.

The discussion regarding the period between 1996 to 2002, and the tax impacts in 2005, which had not been included in REFIS, was resolved in our favor in a final decision of the Federal Tax Court of the state of Rio de Janeiro. This decision determined the full cancellation of the debt in the amount of R\$2.3 billion (as of December 2019).

In 2014, the STJ issued us a favorable decision in the proceeding that had been initiated by us in 2003. The Brazilian Federal Government filed an appeal before the Supreme Court of Justice (*Supremo Tribunal Federal* – “STF”), which was rejected in March 2021. The Brazilian Federal Government filed a new appeal, and a decision is pending.

d) Assessments and legal proceedings related to PIS/COFINS tax credits

We have received several tax assessments from the Brazilian federal tax authority contending that we incorrectly claimed PIS and COFINS tax credits. PIS and COFINS are taxes imposed by the Brazilian government on our gross revenues. Brazilian tax legislation allows taxpayers to use PIS and COFINS tax credits, such as those related to the acquisition of inputs for the production process and other items. Tax authorities claim, mainly, that (i) some credits were not related to the production process, and (ii) we have not submitted adequate evidence of the right to use the tax credits. We are contesting these assessments in the administrative and judicial levels. The total amount in dispute is R\$5.8 billion as of December 31, 2021.

e) Income tax litigation

In 2004, a final decision of the STJ granted us the right to deduct the amounts we had paid as CSLL from our taxable income. In 2006, the Brazilian federal government filed an action (*ação rescisória*) against us, seeking to overturn the 2004 decision. After multiple appeals, in November 2019, the Federal Court of Appeals (*Tribunal Regional Federal*—TRF) reversed the 2004 decision. Despite our appeals, we have decided not to deduct the CSLL from our taxable income for the year 2018 and subsequent years. We and the federal government have filed appeals, and final decision is pending.

In November 2020, we received an assessment of IRPJ relating to deductions of CSLL from our taxable income for the years 2016 and 2017. As of December 31, 2021, the total amount in dispute was R\$2.36 billion, in addition to the reduction of our tax losses with a corresponding tax impact of R\$137 million. We believe that this collection is without merits and that the penalties are undue. We filed an administrative appeal, which was partially granted to reduce the amount of the tax assessment. Both parties have filed additional appeals, and a final decision is pending.

In December 2021, we received a tax assessment for the collection of IRPJ relating to deductions of CSLL from our taxable income for the 2011 to 2013 fiscal years. As of December 31, 2021, the total amount in dispute was R\$5.47 billion, in addition to the reduction of our tax losses with a corresponding tax impact of R\$802 million. We have appealed, and a decision is pending. We believe this charge is without merits, as the claim is time-barred.

For more information on uncertain tax positions, see note 8 to our consolidated financial statements.

f) Fines resulting from the rejection of federal tax offsets

We are engaged in several assessments from the federal tax authorities imposing fines of 50% on the amount of the rejected offsets to pay federal tax debts. The federal tax authorities allege that these offsets were made with improper tax credits. We are challenging these assessments and the tax offset rejection in other proceedings. If we succeed, we expect that the related fines will be cancelled. The constitutional grounds for these fines are currently being challenged by another company in a leading case before the STF, and a favorable decision in this leading case will be applicable to all taxpayers, including us. As of December 31, 2021, the total amount of fines imposed under these assessments were R\$1.6 billion. We may receive new tax assessments based on the same claims.

g) Assessment related to interest on shareholders' equity

We received tax assessments for the collection of IRPJ and CSLL for the 2017 and 2018 fiscal years. The tax authorities disregarded the deduction of interest on shareholder's equity (*Juros sobre Capital Próprio*—"JCP") on the grounds of alleged violation of the accrual basis of accounting and non-compliance with certain deductibility requirements. As of December 31, 2021, the total amount in dispute was R\$5.48 billion, in addition to a reduction of our tax losses, with a corresponding tax impact of R\$699 million. We are challenging these assessments at administrative level. We have also appealed regarding 2017 and 2018 fiscal years, and a decision is pending.

h) Transfer pricing tax assessment

We received tax assessments charging IRPJ and CSLL for the period of 2015 to 2017. Tax authorities claim that we have unduly deducted intermediation costs from the transfer pricing basis related to iron, ore pellets, copper and manganese sales to our foreign controlled company. As of December 31, 2020, the total amount in dispute is R\$3.73 billion, in addition to the reduction of our tax losses in 2015, 2016, and 2017, with a corresponding tax impact of R\$1.88 billion, including penalties and interest. We are challenging these assessments in administrative proceedings. After unfavorable decisions in the first administrative level, we have appealed, and decisions are pending. We may receive similar tax assessments for other fiscal years. For more information on uncertain tax positions, see note 8 to our consolidated financial statements.

i) Proceeding related to income tax paid abroad

We are a party in an administrative proceeding charging IRPJ in the amount of R\$2.23 billion (as of December 31, 2021) due to the partial approval of the tax offset for the year 2016. Tax authorities allege that we have failed to comply with the applicable rules relating to the offset in Brazil of income taxes paid abroad. We believe that this charge is without merit and we are contesting it at the administrative level. Our appeal has been partially granted in the first administrative instance, and we will contest the part that has been unfavorable to us. For more information on uncertain tax positions, see note 8 to our consolidated financial statements.

j) Proceeding on expenses deductions involving Renova

In December 2021, we received an administrative proceeding charging IRPJ and CSLL in relation to the 2016 fiscal year. The tax authorities allege that the deductions of expenses relating to Fundação Renova are improper, as such expenses are not necessary for our own operations. As of December 31, 2020, the total amount in dispute is R\$115 million, in addition to a reduction of our tax losses, with a corresponding tax impact of R\$24 million. We have filed our defense and a decision is pending. We understand that this assessment is without merits, since we are strictly liable for these

obligations, which arise from the Samarco Framework Agreement or *Termo de Transação e Ajustamento de Conduta – TTAC* and from our status of shareholder of Samarco. We may receive similar assessments until a final decision is issued. For more information on uncertain tax positions, see note 8 to our consolidated financial statements.

k) Criminal litigation on ISS on port services at TIG

In July 2021, state prosecutors in the state of Rio de Janeiro initiated a criminal lawsuit against former MBR officers before a criminal court in the municipality of Mangaratiba in connection with alleged tax evasion of service taxes (ISS) levied by the municipality of Mangaratiba on port services of cargo movement at the Terminal Ilha Guaíba (TIG), located in Mangaratiba, in the state of Rio de Janeiro. The lawsuit is at an early stage, currently awaiting for the summon of such officers to present their written defense to seek the case dismissal. We believe this proceeding is without merit.

l) Other tax proceedings

See note 28 to our consolidated financial statements for additional information about these and other tax proceedings in which we are involved, including certain administrative and judicial proceedings relating to the collection of ISS by Brazilian municipalities.

UPDATES ON OTHER PROCEEDINGS

As reported in our annual report on Form 20-F for prior years, we were a party in a public civil action before a state court in Minas Gerais, relating to noise emissions in our operations in the Vargem Grande complex. In November 2021, we entered into a settlement agreement recognizing our right to operate at current noise levels and providing for certain investments of approximately R\$82 million, which was approved by the court.

As also previously reported, we are a party to a public civil action related to the sinking of the Stellar Banner vessel, operated by Polaris Shipping. The vessel had run aground after leaving the Ponta da Madeira Maritime Terminal in February 2020 and following its planned sinking in June 2020, the MPF filed a public civil action against us seeking compensation for alleged environmental damage and reimbursement of the expenses incurred by public authorities. We believe that these claims are without merit and do not foresee a material impact to us as a result of this action.

BYLAWS

COMPANY OBJECTIVES AND PURPOSES

Our corporate purpose is defined by our bylaws to include:

- the exploration of mineral deposits in Brazil and abroad by means of research, extraction, processing, industrialization, transportation, shipment and commerce of mineral goods;
- the building and operation of railways and the provision of our own or unrelated-party rail traffic;
- the building and operation of our own or unrelated-party maritime terminals, and the provision of shipping activities and port services;
- the provision of logistics services integrated with cargo transport, including inflow management, storage, transshipment, distribution and delivery, all within a multimodal transport system;
- the production, processing, transport, industrialization and commercialization of any and all sources and forms of energy, including the production, generation, transmission, distribution and commercialization of our own products, derivatives and sub products;
- engagement, in Brazil or abroad, in other activities that may be of direct or indirect consequence for the achievement of our corporate purposes, including research, industrialization, purchases and sales, importation and exportation, the development, industrialization and commercialization of forest resources and the provision of services of any kind whatsoever; and
- the establishment or participation, in any fashion, in other companies, consortia or associations directly or indirectly related to our business purpose.

COMMON SHARES AND GOLDEN SHARES

Set forth below is certain information concerning our authorized and issued share capital and a brief summary of certain significant provisions of our bylaws and Brazilian corporate law. This description does not purport to be complete and is qualified by reference to our bylaws (an English translation of which we have filed with the SEC) and to Brazilian corporate law.

Our bylaws authorize the issuance of up to 7 billion common shares based solely on the approval of the Board of Directors without any additional shareholder approval.

The Brazilian government holds 12 golden shares of Vale. Our bylaws do not provide for the conversion of golden shares into common shares. In addition, the golden shares do not have any preference upon our liquidation and there are no redemption provisions associated with the golden shares.

Voting Rights

The golden shares are preferred shares that entitle the holder to veto any proposed action relating to the following matters:

- a change in our name;
- a change in the location of our head office;
- a change in our corporate purpose as regards mining activities;
- any liquidation of the Company;
- any disposal or winding up of activities in any of the following parts of our iron ore mining integrated systems: mineral deposits, ore deposits, mines, railways, or ports and maritime terminals;
- any change in the bylaws relating to the rights afforded to the classes of capital stock issued by us; and
- any change in the bylaws relating to the rights afforded the golden shares.

Under Brazilian corporate law and applicable CVM regulations, shareholders representing at least 5% of our voting capital have the right to demand that a cumulative voting procedure be applied in any specific shareholder's meeting. When cumulative voting is applied, each common share has as many votes as there are board members and each holder of common shares has the right to cast all of its vote on one candidate of our Board of Directors or to distribute its votes among several candidates.

See —*Shareholders' meetings* below for more information on the exercise of the voting rights of each share.

Shareholders' meetings

Our Ordinary General Shareholders' Meeting is convened by April of each year for shareholders to resolve upon our financial statements, distribution of profits, election of Directors and Fiscal Council Members, and compensation of senior management. Extraordinary General Shareholders' Meetings are convened by the Board of Directors as necessary in order to decide all other matters relating to our corporate purposes and to pass such other resolutions as may be necessary.

Pursuant to Brazilian corporate law, shareholders voting at a general shareholders' meeting have the power, among other powers, to:

- amend the bylaws;
- elect or dismiss members of the Board of Directors and members of the Fiscal Council at any time;
- establish the remuneration of senior management and members of the Fiscal Council;
- receive annual reports by management and accept or reject management's financial statements and recommendations including the allocation of net profits and the distributable amount for payment of the mandatory dividend and allocation to the various reserve accounts;
- authorize the issuance of convertible and secured debentures;
- suspend the rights of a shareholder in default of obligations established by law or by the bylaws;
- accept or reject the valuation of assets contributed by a shareholder in consideration for issuance of capital stock;
- pass resolutions to reorganize our legal form, to merge, consolidate or split us, to dissolve and liquidate us, to elect and dismiss our liquidators and to examine their accounts; and
- authorize management to file for bankruptcy or to request a judicial restructuring.

Pursuant to CVM recommendations, all general shareholders' meetings, including the annual shareholders' meeting, require no fewer than 30 days' notice to shareholders prior to the scheduled meeting date. Where any general shareholders' meeting is adjourned, 8 days' prior notice to shareholders of the reconvened meeting is required. Pursuant to Brazilian corporate law, a summary of this notice to shareholders is required to be published no fewer than three times, in a newspaper with general circulation in the city where we have our registered office, in Rio de Janeiro, with the simultaneous disclosure of the entire documents on the internet website of such newspaper. We have currently designated *Valor Econômico* as the newspaper for this purpose. Such notice must contain the agenda for the meeting and, in the case of an amendment to our bylaws, an indication of the meeting's subject matter. In addition, under our bylaws, the holder of the golden shares is entitled to a minimum of 15 days' prior formal notice to its legal representative of any general shareholders' meeting to consider any proposed action subject to the veto rights accorded to the golden shares.

A shareholders' meeting may be held if shareholders representing at least one-quarter of the voting capital are present, except, subject to other exceptions, for meetings convened to amend our bylaws, which require a quorum of at least two-thirds of the voting capital. If no such quorum is present, notice must again be given in the same manner described above, and a meeting may then be convened without any specific quorum requirement, subject to the minimum quorum and voting requirements for certain matters, as discussed below.

Except as otherwise provided by law, resolutions of a shareholders' meeting are passed by a simple majority vote, abstentions not being taken into account. Under Brazilian corporate law, the approval of shareholders representing at

least one-half of the issued and outstanding voting shares is required for the types of action described below, as well as, in the case of the first two items below, a majority of issued and outstanding shares of the affected class:

- creating a new class of preferred shares with greater privileges than the golden shares or changing a priority, preference, right, privilege or condition of redemption or amortization of the golden shares;
- reducing the mandatory dividend;
- changing the corporate purposes;
- merging us with another company or consolidating or splitting us;
- participating in a centralized group of companies as defined under Brazilian corporate law;
- dissolving or liquidating us; and
- canceling any ongoing liquidation of us.

Whenever the shares of any class of capital stock are entitled to vote, each share is entitled to one vote. Annual shareholders' meetings must be held by April 30 of each year. Shareholders' meetings are called, convened and presided over by the chairperson or, in case of his absence, by the vice-chairperson of our Board of Directors. In the case of temporary impediment or absence of the chairperson or vice-chairperson of the Board of Directors, the shareholders' meetings may be chaired by a director or other person especially appointed by the chairperson of the Board of Directors.

A shareholder may be represented at a general shareholders' meeting by a proxy appointed in accordance with applicable Brazilian law not more than one year before the meeting, who must be a shareholder, a company officer, a lawyer or a financial institution. If the proxy document is in a foreign language, it must be accompanied by corporate documents or a power of attorney, as applicable, each duly translated into Portuguese by a sworn translator. Notarization and consularization of proxies and supporting documents is not required. Proxies and supporting documents in English or Spanish do not require translation.

Holders of our ADRs are not entitled to vote directly in our shareholders meetings. Holders of ADRs should exercise their voting right pursuant to the depository agreement. For more information see Exhibit 2 to this annual report.

Redemption rights

Our common shares and golden shares are not redeemable, except that a dissenting shareholder is entitled under Brazilian corporate law to obtain redemption upon a decision made at a shareholders' meeting approving any of the items listed above, as well as:

- any decision to transfer all of our shares to another company in order to make us a wholly owned subsidiary of such company, a stock merger;
- any decision to approve the acquisition of control of another company at a price which exceeds certain limits set forth in Brazilian corporate law; or
- in the event that the entity resulting from (i) a merger, (ii) a stock merger as described above or (iii) a spin-off that we conduct fails to become a listed company within 120 days of the general shareholders' meeting at which such decision was taken.

The right of redemption triggered by shareholder decisions to merge, consolidate or to participate in a centralized group of companies may only be exercised if our shares do not satisfy certain tests of liquidity, among others, at the time of the shareholder resolution. The right of redemption lapses 30 days after publication of the minutes of the relevant general shareholders' meeting, unless the resolution is subject to confirmation by the holder of golden shares (which must be made at a special meeting to be held within one year), in which case the 30-day term is counted from the publication of the minutes of the special meeting.

We would be entitled to reconsider any action giving rise to redemption rights within 10 days following the expiration of such rights if the redemption of shares of dissenting shareholders would jeopardize our financial stability. Any redemption pursuant to Brazilian corporate law would be made at no less than the book value per share, determined

on the basis of the last balance sheet approved by the shareholders; provided that if the general shareholders' meeting giving rise to redemption rights occurred more than 60 days after the date of the last approved balance sheet, a shareholder would be entitled to demand that his or her shares be valued on the basis of a new balance sheet dated within 60 days of such general shareholders' meeting.

Preemptive rights

Each of our shareholders has a general preemptive right to subscribe for shares in any capital increase, in proportion to his or her shareholding. A minimum period of 30 days following the publication of notice of a capital increase is assured for the exercise of the right, and the right is transferable. Under our bylaws and Brazilian corporate law, and subject to the requirement for shareholder approval of any necessary increase to our authorized share capital, our Board of Directors may decide not to extend preemptive rights to our shareholders, or to reduce the 30-day period for the exercise of preemptive rights, in each case with respect to any issuance of shares, debentures convertible into shares or warrants in the context of a public offering.

Tag-along rights and mandatory tender offers

In accordance with Novo Mercado listing rules and our bylaws:

- in case of a transfer of control, the purchaser must conduct a tender offer to purchase any and all of our common shares for the same price paid for the voting shares representing control;
- in case of a proposed delisting from the Novo Mercado segment of B3, the controlling shareholder must conduct a public offer to acquire any and all of our common shares for a price corresponding to the economic value of the shares, as determined in an independent appraisal valuation; and
- any shareholder who acquires 25% of our outstanding capital stock must, within 30 days after the date in which such shareholder achieved the 25% stake, make a tender offer for any and all of our common shares (*oferta pública para aquisição*) for a price equal to the greatest of (i) the economic value of the shares, (ii) 120% of the weighted average price of our common shares in the 60 trading days preceding the announcement of the tender offer and (iii) 120% of the highest price paid by the purchaser in the 12 months before achieving the 25% stake.

Calculation of distributable amount

At each Annual shareholders' meeting, the Board of Directors is required to recommend, based on the executive officers' proposal, how to allocate our earnings for the preceding fiscal year. For purposes of Brazilian corporate law, a company's net income after income taxes and social contribution taxes for such fiscal year, net of any accumulated losses from prior fiscal years and amounts allocated to employees' and management's participation in earnings represents its "net profits" for such fiscal year. In accordance with Brazilian corporate law, an amount equal to our net profits, as further reduced by amounts allocated to the legal reserve, to the fiscal incentive investment reserve, to the contingency reserve or to the unrealized income reserve established by us in compliance with applicable law (discussed below) and increased by reversals of reserves constituted in prior years, is available for distribution to shareholders in any given year. Such amount, the adjusted net profits, is referred to herein as the distributable amount. We may also establish discretionary reserves, such as reserves for investment projects.

Brazilian corporate law provides that all discretionary allocations of net profits, including discretionary reserves, the contingency reserve, the unrealized income reserve and the reserve for investment projects, are subject to approval by the shareholders voting at the annual meeting and can be transferred to capital or used for the payment of dividends in subsequent years. The fiscal incentive investment reserve and legal reserve are also subject to approval by the shareholders voting at the annual meeting and may be transferred to capital but are not available for the payment of dividends in subsequent years.

The sum of certain discretionary reserves may not exceed the amount of our paid-in capital. When such limit is reached, our shareholders may vote to use the excess to pay in capital, increase capital or distribute dividends.

Our calculation of net profits and allocations to reserves for any fiscal year are determined on the basis of the unconsolidated financial statements of our parent company, Vale S.A., in *reais*, prepared in accordance with Brazilian corporate law. Our consolidated financial statements have been prepared in accordance with IFRS using U.S. dollars as the reporting currency and, although our allocations to reserves and dividends will be reflected in these financial statements, investors will not be able to calculate such allocations or required dividend amounts from our consolidated financial statements in U.S. dollars.

Mandatory dividend

The Brazilian corporate law and our bylaws require us to distribute to our shareholders, in the form of dividends or interest on shareholders' equity, an annual amount equal to not less than 25% of the distributable amount, referred to as the mandatory dividend, unless the Board of Directors advises our shareholders at our general shareholders' meeting that payment of the mandatory dividend for the preceding year is not advisable in light of our financial condition. To date, our Board of Directors has never determined that payment of the mandatory dividend was not advisable. The Fiscal Council must review any such determination and report it to the shareholders. In addition to the mandatory dividend, our Board of Directors may recommend to the shareholders payment of dividends from other funds legally available therefore. Any payment of interim dividends will be netted against the amount of the mandatory dividend for that fiscal year. The shareholders must also approve the recommendation of the Board of Directors with respect to any required distribution. The amount of the mandatory dividend is subject to the size of the legal reserve, the contingency reserve, and the unrealized income reserve. The amount of the mandatory dividend is not subject to the size of the discretionary tax incentive reserve. See *Additional Information—Bylaws—Common shares and golden shares—Calculation of distributable amount*.

Distributions classified as interest on equity

Brazilian companies are permitted to pay limited amounts to shareholders and treat such payments as an expense for Brazilian income tax purposes. Our bylaws provide for the distribution of interest on shareholders' equity as an alternative form of payment to shareholders. The interest rate applied is limited to the Brazilian long-term interest rate, or TJLP, for the applicable period. The deduction of the amount of interest paid cannot exceed the greater of (1) 50% of net income (after the deduction of the provision of social contribution on net profits and before the deduction of the provision of the corporate income tax) before taking into account any such distribution for the period in respect of which the payment is made or (2) 50% of the sum of retained earnings and profit reserves. Any payment of interest on shareholders' equity is subject to Brazilian withholding income tax. See *Additional Information—Taxation—Brazilian tax considerations*. Under our bylaws, the amount paid to shareholders as interest on shareholders' equity (net of any withholding tax) may be included as part of any mandatory and minimum dividend. Under Brazilian corporate law, we are obligated to distribute to shareholders an amount sufficient to ensure that the net amount received, after payment by us of applicable Brazilian withholding taxes in respect of the distribution of interest on shareholders' equity, is at least equal to the mandatory dividend.

Form and transfer of shares

Our common shares and golden shares are in book-entry form registered in the name of each shareholder. The transfer of such shares is made under Brazilian corporate law, which provides that a transfer of shares is effected by our transfer agent, Banco Bradesco, upon presentation of valid share transfer instructions to us by a transferor or its representative. When common shares are acquired or sold on a Brazilian stock exchange, the transfer is effected on the records of our transfer agent by a representative of a brokerage firm or the stock exchange's clearing system. Transfers of shares by a foreign investor are made in the same way and are executed by the investor's local agent, who is also responsible for updating the information relating to the foreign investment furnished to the Central Bank of Brazil.

The B3 operates a central clearing system through *Companhia Brasileira de Liquidação e Custódia*, or CBLC. A holder of our shares may participate in this system and all shares elected to be put into the system will be deposited in custody with CBLC (through a Brazilian institution that is duly authorized to operate by the Central Bank of Brazil and maintains a clearing account with CBLC). The fact that such shares are subject to custody with the relevant stock exchange will

be reflected in our registry of shareholders. Each participating shareholder will, in turn, be registered in the register of our beneficial shareholders that is maintained by CBLC and will be treated in the same way as registered shareholders.

PARTICIPATIVE STOCKHOLDERS' DEBENTURES

At the time of the first stage of our privatization in 1997, we issued Brazilian law governed debentures known in Brazil as "*debêntures participativas*" to our then-existing shareholders. The terms of the debentures were established to ensure that our pre-privatization shareholders, including the Brazilian government, would participate alongside us in potential future financial benefits that we derive from exploiting certain mineral resources that were not taken into account in determining the minimum purchase price of our shares in the privatization. In accordance with the debentures deed, holders have the right to receive semi-annual payments equal to an agreed percentage of our net revenues (revenues less value-added tax, transport fee and insurance expenses related to the trading of the products) from certain identified mineral resources that we owned at the time of the privatization, to the extent that we exceed defined thresholds of sales volume relating to certain mineral resources, and from the sale of mineral rights that we owned at that time. Our obligation to make payments to the holders will cease when all the relevant mineral resources are exhausted, sold or otherwise disposed of by us.

We made available for withdrawal by holders of participative stockholders' debentures US\$418 million in 2021, US\$183 million in 2020 and US\$194 million in 2019. See note 22 to our consolidated financial statements for a description of the terms of the debentures.

EXCHANGE CONTROLS AND OTHER LIMITATIONS AFFECTING SECURITY HOLDERS

Under Brazilian corporate law, there are no restrictions on ownership of our capital stock by individuals or legal entities domiciled outside Brazil. However, the right to convert dividend payments and proceeds from the sale of common shares into foreign currency and to remit such amounts outside Brazil is subject to restrictions under foreign investment legislation, which generally requires, among other things, that the relevant investment be registered with the Central Bank of Brazil. These restrictions on the remittance of foreign capital abroad could hinder or prevent the depositary bank and its agents for the common shares represented by ADSs from converting dividends, distributions or the proceeds from any sale of common shares or rights, as the case may be, into U.S. dollars and remitting such amounts abroad. Delays in, or refusal to grant any required government approval for conversions of Brazilian currency payments and remittances abroad of amounts owed to holders of ADSs could adversely affect holders of ADRs.

Under CMN Resolution 4,373 of 2014 ("Resolution 4,373"), foreign investors, defined to include individuals, legal entities, mutual funds and other collective investment entities, domiciled or headquartered outside Brazil, may invest in almost all financial assets and engage in almost all transactions available in the Brazilian financial and capital markets, provided that they:

- i. appoint at least one representative in Brazil, with powers to perform actions relating to its investment,
- ii. complete the appropriate foreign investor registration form,
- iii. register as a foreign investor with the CVM, and register its foreign investment with the Central Bank of Brazil, and
- iv. appoint a custodian, duly licensed by the Central Bank of Brazil, if the Brazilian representative in item (i) is not a financial institution.

Resolution 4,373 specifies the manner of custody and the permitted means for trading securities held by foreign investors under the resolution. The offshore transfer or assignment of securities or other financial assets held by foreign investors pursuant to Resolution 4,373 is prohibited, except for transfers resulting from a corporate reorganization, or occurring upon the death of an investor by operation of law or will.

Resolution 4,373 also provides for the issuance of depositary receipts in foreign markets in respect of shares of Brazilian issuers. It provides that the proceeds from the sale of ADSs by holders of ADRs outside Brazil are not subject to Brazilian foreign investment controls and holders of ADSs who are not residents of a low-tax jurisdiction (*país com tributação favorecida*), as defined by Brazilian law, will be entitled to favorable tax treatment.

An electronic registration has been issued to the custodian in the name of the depositary with respect to the ADSs. Pursuant to this electronic registration, the custodian and the depositary are able to convert dividends and other distributions with respect to the underlying shares into foreign currency and to remit the proceeds outside Brazil. If a holder exchanges ADSs for common shares, the holder must, within five business days, seek to obtain its own electronic registration with the Central Bank of Brazil under Law 4,131 of 1962 and Resolution 4,373. Thereafter, unless the holder has registered its investment with the Central Bank of Brazil, such holder may not convert into foreign currency and remit outside Brazil the proceeds from the disposition of, or distributions with respect to, such common shares.

Under Brazilian law, whenever there is a serious imbalance in Brazil's balance of payments or reasons to foresee a serious imbalance, the Brazilian government may impose temporary restrictions on the remittance to foreign investors of the proceeds of their investments in Brazil, and on the conversion of Brazilian currency into foreign currencies. Such restrictions may hinder or prevent the custodian or holders who have exchanged ADSs for underlying common shares from converting distributions or the proceeds from any sale of such shares, as the case may be, into U.S. dollars and remitting such U.S. dollars abroad. In the event the custodian is prevented from converting and remitting amounts

owed to foreign investors, the custodian will hold the *reais* it cannot convert for the account of the holders of ADRs who have not been paid. The depository will not invest the *reais* and will not be liable for interest on those amounts. Any *reais* so held will be subject to devaluation risk against the U.S. dollar.

TAXATION

The following summary contains a description of the principal Brazilian and U.S. federal income tax consequences of the ownership and disposition of common shares or ADSs. You should know that this summary does not purport to be a comprehensive description of all the tax considerations that may be relevant to a holder of common shares or ADSs.

Holders of common shares or ADSs should consult their own tax advisors to discuss the tax consequences of the purchase, ownership and disposition of common shares or ADSs, including, in particular, the effect of any state, local or other national tax laws.

Although there is at present no treaty to avoid double taxation between Brazil and the United States, both countries' tax authorities have been having discussions that may result in the execution of such a treaty. In this regard, the two countries signed a Tax Information Exchange Agreement on March 20, 2007, which the Brazilian government approved in May 2013. We cannot predict whether or when such a treaty will enter into force or how, if entered into, such a treaty will affect the U.S. holders, as defined below, of common shares or ADSs.

BRAZILIAN TAX CONSIDERATIONS

The following discussion summarizes the principal Brazilian tax consequences of the acquisition, ownership and disposition of common shares or ADSs by a holder not deemed to be domiciled in Brazil for purposes of Brazilian taxation ("Non-Resident Holder"). It is based on the tax laws of Brazil and regulations thereunder in effect on the date hereof, which are subject to change (possibly with retroactive effect). This discussion does not specifically address all of the Brazilian tax considerations applicable to any particular Non-Resident Holder. Therefore, Non-Resident Holders should consult their own tax advisors concerning the Brazilian tax consequences of an investment in common shares or ADSs.

Shareholder distributions

For Brazilian corporations, such as Vale, distributions to shareholders are classified as either dividend or interest on shareholders' equity.

Dividends

Amounts distributed as dividends will generally not be subject to Brazilian withholding income tax if the distribution is paid only from profits for the corresponding year, as determined under Brazilian tax principles. Dividends paid from profits generated before January 1, 1996 may be subject to Brazilian withholding income tax at varying rates depending on the year the profits were generated. Dividends paid from sources other than profits as determined under Brazilian tax principles may be subject to withholding tax.

Interest on shareholders' equity

Amounts distributed as interest on shareholders' equity are generally subject to withholding income tax at the rate of 15%, except where:

- i. the beneficiary is exempt from tax in Brazil, in which case the distribution will not be subject to withholding income tax;
- ii. the beneficiary is located in a jurisdiction that does not impose income tax or where the maximum income tax rate is lower than 17% (a "Low Tax Jurisdiction") or where internal legislation imposes restrictions on the disclosure of the shareholding structure or the ownership of the investment, as listed by the Brazilian federal tax authority in which case the applicable withholding income tax rate is 25%; or

- iii. the effective beneficiary is resident in Japan, in which case the applicable withholding income tax rate is 12.5%.

Interest on shareholders' equity is calculated as interest rate on the sum of the following accounts: (i) share capital, (ii) capital reserves, (iii) profits reserves, (iv) treasury stocks and (v) accumulated losses. The interest rate applied may not exceed the TJLP, the benchmark Brazilian long-term interest rate. In addition, the amount of distributions classified as interest on shareholders' equity may not be more than the greater of (1) 50% of net income (after the deduction of social contribution on net profits but before taking into account such payment of interest and the provision for corporate income tax) for the period in respect of which the payment is made and (2) 50% of the sum of retained earnings and profit reserves.

Payments of interest on shareholders' equity are deductible for the purposes of corporate income tax and social contribution on net profit, to the extent of the limits described above. The benefit of a distribution by way of interest on shareholders' equity is a reduction in the Company's corporate tax charge by an amount equivalent to 34% of such distribution.

Taxation of capital gains

Taxation of Non-Resident Holders on capital gains depends on the status of the holder as either:

- (i) a holder that is not resident or domiciled in a Low Tax Jurisdiction, or in a jurisdiction where internal legislation imposes restrictions on the disclosure of shareholding structure or the ownership of the investment, and that has registered its investment in Brazil in accordance with Resolution 4,373 (a "4,373 Holder"), or (ii) a holder of ADSs; or
- any other Non-Resident Holder.

Investors identified in items (i) or (ii) are subject to favorable tax treatment, as described below.

Capital gains realized by a Non-Resident Holder from the disposition of "assets located in Brazil" are subject to taxation in Brazil. Common shares qualify as assets located in Brazil, and the disposition of such assets by a Non-Resident Holder may be subject to income tax on the gains assessed, in accordance with the rules described below, regardless of whether the transaction is carried out with another non-Brazilian resident or with a Brazilian resident.

There is some uncertainty as to whether ADSs qualify as "assets located in Brazil" for this purpose. Arguably, the ADSs do not constitute assets located in Brazil and therefore the gains realized by a Non-Resident Holder on the disposition of ADSs to another non-Brazilian resident should not be subject to income tax in Brazil. However, it is not certain that the Brazilian courts will uphold this interpretation of the definition of "assets located in Brazil" in connection with the taxation of gains realized by a Non-Resident Holder on the disposition of ADSs. Consequently, gains on a disposition of ADSs by a Non-Resident Holder (whether in a transaction carried out with another Non-Resident Holder or a person domiciled in Brazil) may be subject to income tax in Brazil in accordance with the rules applicable to a disposition of shares.

Although there are arguments to the contrary, the deposit of common shares in exchange for ADSs may be subject to Brazilian income tax if the acquisition cost of the shares being deposited is lower than the average price, determined as either:

- the average price per common share on the Brazilian stock exchange in which the greatest number of such shares were sold on the day of deposit; or
- if no common shares were sold on that day, the average price on the Brazilian stock exchange in which the greatest number of common shares were sold in the 15 trading sessions immediately preceding such deposit.

The positive difference between the average price of the common shares calculated as described above and their acquisition cost will be considered to be a capital gain subject to income tax in Brazil. In some circumstances, there are

grounds to conclude that such taxation is not applicable with respect to any 4,373 Holder, provided such holder is not located in a Low Tax Jurisdiction.

The withdrawal of common shares by holders in exchange for ADSs is not subject to Brazilian income tax, subject to compliance with applicable regulations regarding the registration of the investment with the Central Bank of Brazil.

For the purpose of Brazilian taxation, the income tax rules on gains related to disposition of common shares vary depending on:

- the domicile of the Non-Resident Holder;
- the method by which such Non-Resident Holder has registered his investment with the Central Bank of Brazil; and
- how the disposition is carried out, as described below.

The gain realized as a result of a transaction on a Brazilian stock exchange is the difference between: (i) the amount in Brazilian currency realized on the sale or disposition and (ii) the acquisition cost, without any adjustment for inflation, of the securities that are the subject of the transaction.

Under the applicable rules, any gain realized by a Non-Resident Holder on a sale or disposition of common shares carried out on the Brazilian stock exchange is:

- exempt from income tax where the Non-Resident Holder (i) is a 4,373 Holder; and (ii) is not located in a Low Tax Jurisdiction;
- subject to income tax at a rate of 15% where the Non-Resident Holder (i) is not a 4,373 Holder and (ii) is not resident or domiciled in a Low Tax Jurisdiction; or
- subject to income tax at a rate of 25% where the Non-Resident Holder (i) is not a 4,373 Holder and (ii) is resident or domiciled in a Low Tax Jurisdiction.

The above summary applies to different investment scenarios. The understanding of tax authorities may change from time to time and you should consult your tax advisors with regard to the application of the rates to your specific case.

The sale or disposition of common shares carried out on the Brazilian stock exchange is subject to withholding tax at the rate of 0.005% on the sale value. This withholding tax can be offset against the eventual income tax due on the capital gain. A 4,373 Holder that is not resident or domiciled in a Low Tax Jurisdiction is not subject to this withholding tax.

Since January 1, 2017, the capital gains realized by Non-Residents Holders and individuals resident in Brazil are subject to income tax (i) at progressive rates ranging from 15% to 22.5%, where the Non-Resident Holder is not a 4,373 Holder and is not resident or domiciled in a Low Tax Jurisdiction or (ii) at a rate of 25% where the Non-Resident Holder is resident or domiciled in a Low Tax Jurisdiction.

With respect to transactions arranged by a broker that are conducted on the Brazilian non-organized over-the-counter market, a withholding income tax at a rate of 0.005% on the sale value is levied on the transaction and can be offset against the eventual income tax due on the capital gain.

In the case of a redemption of common shares or ADSs or a capital reduction by a Brazilian corporation, the positive difference between the amount received by any Non-Resident Holder and the acquisition cost of the common shares or ADSs being redeemed is treated as capital gain and is therefore generally subject to income tax at the progressive rate from 15% to 22.5%, while the 25% rate applies to residents in a Low Tax Jurisdiction.

Any exercise of pre-emptive rights relating to our common shares will not be subject to Brazilian taxation. Any gain realized by a Non-Resident Holder on the disposition of pre-emptive rights relating to common shares in Brazil will be subject to Brazilian income taxation in accordance with the same rules applicable to the sale or disposition of common shares.

Tax on foreign exchange and financial transactions

Foreign exchange transactions

Brazilian law imposes a tax on foreign exchange transactions, or an IOF/Exchange Tax, due on the conversion of *reais* into foreign currency and on the conversion of foreign currency into *reais*. Currently, for most foreign currency exchange transactions, the rate of IOF/Exchange Tax is 0.38%.

The outflow of resources from Brazil related to investments held by a Non-Resident Holder in the Brazilian financial and capital markets is currently subject to IOF/Exchange Tax at a zero percent rate. In any case, the Brazilian government may increase such rates at any time, up to 25%, with no retroactive effect.

Transactions involving securities

Brazilian law imposes a tax on transactions involving securities, or an IOF/Securities Tax, including those carried out on the Brazilian stock exchange. The rate of IOF/Securities Tax applicable to transactions involving publicly traded securities in Brazil is currently zero. The rate of IOF/Securities Tax applicable to a transfer of shares traded on the Brazilian stock exchange to back the issuance of depositary receipts has also been zero since December 24, 2013. However, the Brazilian Government may increase such rates at any time up to 1.5% of the transaction amount per day, but the tax cannot be applied retroactively.

Other Brazilian taxes

There are no Brazilian inheritance, gift or succession taxes applicable to the ownership, transfer or disposition of common shares or ADSs by a Non-Resident Holder, except for gift and inheritance taxes which are levied by some states of Brazil on gifts made or inheritances bestowed by a Non-Resident Holder to individuals or entities resident or domiciled within such states in Brazil. There are no Brazilian stamp, issue, registration, or similar taxes or duties payable by holders of common shares or ADS.

U.S. FEDERAL INCOME TAX CONSIDERATIONS

This summary does not purport to be a comprehensive description of all the U.S. federal income tax consequences of the acquisition, holding or disposition of the common shares or ADSs. This summary applies to U.S. holders, as defined below, who hold their common shares or ADSs as capital assets and does not apply to special classes of holders, such as:

- certain financial institutions,
- insurance companies,
- dealers in securities or foreign currencies,
- tax-exempt organizations,
- securities traders who elect to account for their investment in common shares or ADSs on a mark-to-market basis,
- persons holding common shares or ADSs as part of hedge, straddle, conversion or other integrated financial transactions for tax purposes,
- holders whose functional currency for U.S. federal income tax purposes is not the U.S. dollar,
- partnerships or other holders treated as “pass-through entities” for U.S. federal income tax purposes (or partners therein), or
- persons owning, actually or constructively through attribution rules, 10% or more of our voting shares or the total value of all classes of shares.

This discussion is based on the Internal Revenue Code of 1986, as amended to the date hereof, administrative pronouncements, judicial decisions and final, temporary and proposed Treasury Regulations, all as in effect on the date hereof. These authorities are subject to differing interpretations and may be changed, perhaps retroactively, so as to

result in U.S. federal income tax consequences different from those discussed below. There can be no assurance that the U.S. Internal Revenue Service (the “IRS”) will not challenge one or more of the tax consequences discussed herein or that a court will not sustain such a challenge in the event of litigation. This summary does not address the Medicare tax on net investment income, the alternative minimum tax, U.S. federal estate and gift taxes, or any aspect of state, local or non-U.S. tax law.

YOU SHOULD CONSULT YOUR TAX ADVISORS WITH REGARD TO THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS TO YOUR PARTICULAR SITUATIONS AS WELL AS ANY TAX CONSEQUENCES ARISING UNDER THE LAWS OF ANY STATE, LOCAL OR NON-U.S. TAXING JURISDICTION.

This discussion is also based, in part, on representations of the depository and the assumption that each obligation in the deposit agreement and any related agreement will be performed in accordance with its terms.

For purposes of this discussion, you are a “U.S. holder” if you are a beneficial owner of common shares or ADSs that is, for U.S. federal income tax purposes:

- a citizen or resident alien individual of the United States,
- a corporation created or organized in or under the laws of the United States or of any political subdivision thereof, or
- otherwise subject to U.S. federal income taxation on a net income basis with respect to common shares or ADSs.

The term U.S. holder also includes certain former citizens of the United States.

In general, if you are the beneficial owner of American depository receipts evidencing ADSs, you will be treated as the beneficial owner of the common shares represented by those ADSs for U.S. federal income tax purposes. Deposits and withdrawals of common shares by you in exchange for ADSs will not result in the realization of gain or loss for U.S. federal income tax purposes. Your tax basis in such common shares will be the same as your tax basis in such ADSs, and the holding period in such common shares will include the holding period in such ADSs.

Taxation of dividends

The gross amount of a distribution paid on ADSs or common shares, including distributions paid in the form of payments of interest on shareholder’s equity for Brazilian tax purposes, out of our current or accumulated earnings and profits (as determined for U.S. federal income tax purposes) generally will be taxable to you as foreign source dividend income and generally will not be eligible for the dividends-received deduction allowed to corporate shareholders under U.S. federal income tax law. The amount of any such distribution will include the amount of Brazilian withholding taxes, if any, withheld on the amount distributed. To the extent that a distribution exceeds our current and accumulated earnings and profits, such distribution will be treated as a nontaxable return of capital to the extent of your basis in the ADSs or common shares, as the case may be, with respect to which such distribution is made, and thereafter as a capital gain.

We do not expect to maintain calculations of our earnings and profits in accordance with U.S. federal income tax principles. You therefore should expect that distributions generally will be treated as dividends for U.S. federal income tax purposes.

You generally will be required to include dividends paid in *reais* in income in an amount equal to their U.S. dollar value calculated by reference to an exchange rate in effect on the date such distribution is received by the depository, in the case of ADSs, or by you, in the case of common shares. If the depository or you do not convert such *reais* into U.S. dollars on the date they are received, it is possible that you will recognize foreign currency loss or gain, which generally would be treated as ordinary loss or gain from sources within the United States, when the *reais* are converted into U.S. dollars. If you hold ADSs, you will be considered to receive a dividend when the dividend is received by the depository.

Subject to certain exceptions for short-term and hedged positions, the U.S. dollar amount of dividends received by certain non-corporate taxpayers, including individuals, will be subject to taxation at the preferential rates applicable to long-term capital gains if the dividends are “qualified dividends.” Dividends paid on the ADSs will be treated as qualified dividends if (i) the ADSs are readily tradable on an established securities market in the United States and (ii) the Company was not, in the year prior to the year in which the dividend was paid, and is not, in the year in which the dividend is paid, a passive foreign investment company (“PFIC”). The ADSs are listed on the New York Stock Exchange and will qualify as readily tradable on an established securities market in the United States so long as they are so listed. Based on Vale’s audited financial statements and relevant market and shareholder data, Vale believes that it was not treated as a PFIC for U.S. federal income tax purposes with respect to its 2020 or 2021 taxable years. In addition, based on Vale’s audited financial statements and its current expectations regarding the value and nature of its assets, the sources and nature of its income, and relevant market and shareholder data, Vale does not anticipate becoming a PFIC for its 2022 taxable year.

Based on existing guidance, it is not entirely clear whether dividends received with respect to common shares will be treated as qualified dividends (and therefore whether such dividends will qualify for the preferential rates of taxation applicable to long-term capital gains), because the common shares are not themselves listed on a U.S. exchange. You should consult your own tax advisors regarding the availability of the reduced dividend tax rate in light of your own particular circumstances.

Subject to generally applicable limitations and restrictions, you may be entitled to a credit against your U.S. federal income tax liability, or a deduction in computing your U.S. federal taxable income, for Brazilian income taxes withheld by us at the appropriate rate applicable to the U.S. holder. You must satisfy minimum holding period requirements to be eligible to claim a foreign tax credit for Brazilian taxes withheld on dividends. The limitation on foreign taxes eligible for credit is calculated separately for specific categories of income. For this purpose dividends paid by us on our common shares or ADSs will generally constitute “passive income.” Foreign tax credits may not be allowed for withholding taxes imposed in respect of certain short-term or hedged positions in securities or in respect of arrangements in which a U.S. holder’s expected economic profit is insubstantial. You should consult your own tax advisors concerning the implications of these rules in light of your particular circumstances.

Taxation of capital gains

Upon a sale or exchange of common shares or ADSs, you generally will recognize a capital gain or loss for U.S. federal income tax purposes equal to the difference, if any, between the amount realized on the sale or exchange and your adjusted tax basis in the common shares or ADSs. This gain or loss will be long-term capital gain or loss if your holding period in the common shares or ADSs exceeds one year. The net amount of long-term capital gain recognized by individual U.S. holders generally is subject to taxation at preferential rates. Your ability to use capital losses to offset income is subject to limitations.

Any gain or loss generally will be U.S. source gain or loss for U.S. foreign tax credit purposes. For taxable years beginning after December 28, 2021, any Brazilian tax imposed on the sale or disposition of common shares is unlikely to be treated as a creditable foreign tax. You should consult your own tax advisor regarding the application of the foreign tax credit rules to your investment in, and disposition of, ADSs or common shares.

If a Brazilian tax is withheld on the sale or disposition of common shares or ADSs, the amount realized by a U.S. holder will include the gross amount of the proceeds of such sale or disposition before deduction of the Brazilian tax. See — *Brazilian tax considerations* above.

Foreign financial asset reporting

Certain U.S. holders that own “specified foreign financial assets” with an aggregate value in excess of US\$50,000 on the last day of the taxable year or US\$75,000 at any time during the taxable year are generally required to file an information statement along with their tax returns, currently on IRS Form 8938, with respect to such assets. “Specified foreign financial assets” include any financial accounts held at a non-U.S. financial institution, as well as securities issued by a

non-U.S. issuer that are not held in accounts maintained by financial institutions. Higher reporting thresholds apply to certain individuals living abroad and to certain married individuals. Regulations extend this reporting requirement to certain entities that are treated as formed or availed of to hold direct or indirect interests in “specified foreign financial assets” based on certain objective criteria. The understatement of income attributable to “specified foreign financial assets” in excess of US\$5,000 extends the statute of limitations with respect to the tax return to six years after the return was filed. U.S. holders who fail to report the required information could be subject to substantial penalties. You are encouraged to consult with your own tax advisors regarding the possible application of these rules, including the application of the rules to your particular circumstances.

Information reporting and backup withholding

Information returns may be filed with the IRS in connection with distributions on the common shares or ADSs and the proceeds from their sale or other disposition. You may be subject to U.S. federal backup withholding tax on these payments if you fail to provide your taxpayer identification number or comply with certain certification procedures or otherwise establish an exemption from backup withholding. If you are required to make such a certification or to establish such an exemption, you generally must do so on IRS Form W-9.

Backup withholding is not an additional tax. The amount of any backup withholding from a payment to you will be allowed as a credit against your U.S. federal income tax liability and may entitle you to a refund, provided that the required information is timely furnished to the IRS.

A holder that is a non-U.S. corporation or a non-resident alien individual may be required to comply with certification and identification procedures in order to establish its exemption from information reporting and backup withholding.

CONTROLS AND PROCEDURES

EVALUATION OF DISCLOSURE CONTROLS AND PROCEDURES

Our management, with the participation of our chief executive officer and chief financial officer, has evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2021. There are inherent limitations to the effectiveness of any system of disclosure controls and procedures, including the possibility of human error and the circumvention or overriding of the controls and procedures. Accordingly, even effective disclosure controls and procedures can only provide reasonable assurance of achieving their control objectives.

Our chief executive officer and chief financial officer have concluded that as of December 31, 2021 our disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, were effective to provide reasonable assurance that information required to be disclosed by us in the reports filed or submitted under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the applicable rules and forms, and that it is accumulated and communicated to our management, including our chief executive officer and chief financial officer, as appropriate to allow timely decisions regarding required disclosure.

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act). Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Our internal control over financial reporting includes those policies and procedures that: (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the Company; (ii) provide reasonable assurance that transactions are recorded to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the Company are being made only in accordance with authorizations of management and directors of the Company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of our assets that could have a material effect on the financial statements. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of the effectiveness to future periods are subject to the risk that controls may become inadequate and that the degree of compliance with the policies or procedures may deteriorate.

Our management has assessed the effectiveness of Vale's internal control over financial reporting as of December 31, 2021 based on the criteria established in "Internal Control—Integrated Framework (2013)" issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on such assessment and criteria, our management has concluded that our internal control over financial reporting was effective as of December 31, 2021.

AUDIT OF THE EFFECTIVENESS OF INTERNAL CONTROL OVER FINANCIAL REPORTING

The effectiveness of our internal control over financial reporting as of December 31, 2021 has been audited by PricewaterhouseCoopers Auditores Independentes Ltda., an independent registered public accounting firm, as stated in their report which appears herein.

CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

Our management identified no change in our internal control over financial reporting during our fiscal year ended December 31, 2021 that has materially affected or is reasonably likely to materially affect our internal control over financial reporting.

CORPORATE GOVERNANCE

Under NYSE rules, foreign private issuers are subject to more limited corporate governance requirements than U.S. domestic issuers. As a foreign private issuer, we must comply with four principal NYSE corporate governance rules: (1) we must satisfy the requirements of Exchange Act Rule 10A-3 relating to Audit Committees; (2) our chief executive officer must promptly notify the NYSE in writing after any executive officer becomes aware of any non-compliance with the applicable NYSE corporate governance rules; (3) we must provide the NYSE with annual and interim written affirmations as required under the NYSE corporate governance rules; and (4) we must provide a brief description of any significant differences between our corporate governance practices and those followed by U.S. companies under NYSE listing standards. The table below briefly describes the significant differences between our practices and the practices of U.S. domestic issuers under NYSE corporate governance rules.

Since 2018, we also report our compliance with the Code of Best Practices for Corporate Governance of the Brazilian Corporate Governance Institute (IBGC), as required by Brazilian regulations. The code is based on the “comply or explain” principle, and we currently fully comply with 96% of the practices recommended by the IBGC and partially comply with 1.85% of practices recommended by the code.

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
303A.01	A listed company must have a majority of independent directors.	Our bylaws provide for a Board of Directors consisting of 11 to 13 members, and require that at least seven directors be independent. Since the election of the members of the Board of Directors in our 2021 annual shareholders’ meeting, we have eight independent directors.
303A.03	The non-management directors of a listed company must meet at regularly scheduled executive sessions without management.	We do not have any management directors. Our directors meet at regularly scheduled sessions without management.
303A.04	A listed company must have a nominating/corporate governance committee composed entirely of independent directors, with a written charter that covers certain minimum specified duties.	<p>We do not have a nominating/corporate governance committee composed entirely of independent directors. However, we do have a People, Compensation and Governance Committee and a Nomination Committee, which are advisory committees to the Board of Directors (which may include members who are not directors) with written charters that cover similar specified duties.</p> <p>According to its charter, the People, Compensation and Governance Committee is responsible, among other matters, for:</p> <ul style="list-style-type: none"> - evaluating our human resources policies proposed by the Board of Executive Officers to the Board of Directors; - supporting the Board of Directors in monitoring and encouraging initiatives related to our organizational culture, valuing diversity and inclusion; - evaluating the adequacy of the compensation model of members of the Board of Executive Officers and the proposal for the distribution of the global annual budget for the compensation of our management; - supporting the Board of Directors in the process of selecting and appointing the CEO, and evaluating the appointment, by

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
		<p>the latter, of the other members of the Board of Executive Officers and other officers who report directly to the CEO;</p> <ul style="list-style-type: none"> - supporting the Board of Directors in the process of selection, remuneration, annual performance evaluation and removal of the Corporate Governance Secretary and the Compliance Officer, the latter together with the Audit Committee; - supporting the Board of Directors in the process of selecting and appointing the CEO, and evaluating the appointment, by the latter, of the other members of the Board of Executive Officers and other officers who report directly to the CEO; - monitoring the development of the succession plan for the Board of Executive Officers other officers who report directly to the CEO, as well as their successors, taking into account the expected experience and knowledge for such positions; - supporting the Board of Directors in identifying and recommending potential candidates to be members of the advisory committees, including in case absences, impediments and vacancies, pursuant to our bylaws; - supporting the Chairperson of the Board of Directors in organizing the process for performance evaluation of the Board of Directors and advisory committees; - periodically evaluating and recommending adjustments to corporate governance documents, including our policies, bylaws, Code of Conduct and internal regulations of the advisory committees and the Board of Directors, among others; - promoting and ensuring the continuous improvement of our governance practices, including in relation to the structure, scope and composition of the Board of Executive Officers and the advisory committees of the Board of Directors, and annually reviewing our governance system; - preparing and submitting to the Board of Directors the annual work plan of the committee; and - preparing and submitting to the Board of Directors, an report on the performance of the committee. <p>According to its charter, the Nomination Committee is responsible, among other matters, for:</p> <ul style="list-style-type: none"> - assisting the Board of Directors in the elaboration and maintenance of the Nomination Policy, applicable to the members of the Board of Directors, in line with the applicable legal requirements and the best corporate governance practices; - periodically assessing and recommending adjustments in the structure, size and composition of the Board of Directors, as well as the balance of experience, knowledge and diversity of profiles, in line with best practices of corporate governance

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
		<p>and based on market research and assessments by external consulting firms and institutions;</p> <ul style="list-style-type: none"> - assessing and recommending the profiles of candidates for positions in the Board of Directors, according to criteria and guidelines set forth in the Nomination Policy; - identifying, selecting and recommending potential candidates for positions in the Board of Directors; - identifying, selecting and recommending to the Board of Directors potential candidates in case of absences, impediments or vacancies; - preparing and/or updating the Board of Directors' succession plan to be approved by the end of each term, so as to maintain a balance of experience, knowledge and diversity of the members' profile; and - preparing and approving the committee's work plan. <p>According to its charter, the Nomination Committee shall be composed of three members, the Chairperson of our Board of Directors and two independent members. However, upon justification arising from special situations, the Board of Directors may decide that the Nomination Committee shall be entirely composed by members of the Board of Directors, being composed of up to four members.</p> <p>For the purpose of the composition of the committee, an independent member is a person who complies with the independence standards of the Novo Mercado segment of B3, pursuant to which such person may not (i) be a controlling shareholder of Vale; (ii) have its vote subject to a shareholders agreement; (iii) be a relative, to the second degree, of any director or executive of Vale; or (iv) have been an employee or executive of Vale in the past three years. The Novo Mercado rules also provide for other situations that require a case-by-case analysis of such person's independence.</p>
303A.05	A listed company must have a compensation committee composed entirely of independent directors, with a written charter that covers certain minimum specified duties.	<p>We do not have a compensation committee composed entirely of independent directors.</p> <p>However, we have a People, Compensation and Governance Committee, which is an advisory committee to the Board of Directors (which may include an independent member who is not a director). This committee is responsible for, among other attributions:</p> <ul style="list-style-type: none"> - evaluating our human resources policies proposed by the Board of Executive Officers to the Board of Directors; - evaluating the adequacy of the compensation model of members of the Board of Executive Officers and the proposal for the distribution of the global annual budget for the compensation of our management; and

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
303A.06	Listed companies must have an audit committee that complies with the requirements of Rule 10A-3 under the Exchange Act.	<ul style="list-style-type: none"> - supporting the Board of Directors in setting and monitoring goals for the performance evaluation of the Board of Executive Officers and other leaders who report directly to the CEO.
303A.07	The audit committee must have at least three members, and these members must comply with the independence requirements of Section 303A.02 of the NYSE Listed Company Manual; the audit committee must have a written charter compliant with the requirements of Section 303A.07(b) of the NYSE Listed Company Manual; and listed companies must have an internal audit function.	<p>We do not have an Audit Committee that complies with Rule 10A-3 under the Exchange Act, but our Audit Committee meets the requirements for the exemption under Rule 10A 3(c)(3). In lieu of appointing an Audit Committee composed of independent members of the Board of Directors, we have established in our bylaws the requirements for the composition of our Audit Committee considering also the listing rules of the Novo Mercado segment of B3 (the Brazilian Stock Exchange) and the Brazilian corporate regulations.</p> <p>We comply with the listing rules of the Novo Mercado segment of B3 and Brazilian Corporate regulations. Under our bylaws and the Audit Committee's charter, and pursuant to the Novo Mercado listing rules, our Audit Committee shall have between three and five members. In addition, (i) all the members of our Audit Committee must comply with the independence requirements set forth in item 2.5 of the Audit Committee's charter, (ii) at least one of the members of our Audit Committee must be an independent member of the Board of Directors, (iii) at least one of the members of our Audit Committee must not be a member of the Board of Directors or any other of our corporate bodies, and (iv) at least one of the members of our Audit Committee must satisfy audit/financial expertise requirements of the CVM. The requirement of audit/financial expertise may be satisfied by the same person that satisfies the requirements described items (ii) or (iii) above.</p> <p>The responsibilities of the Audit Committee are set forth in its charter. Under our bylaws, the charter must give the Audit Committee responsibility for the matters required under Novo Mercado listing rules, as well as responsibility for:</p> <ul style="list-style-type: none"> - having means and establishing procedures to be used by the company to receive, process and handle accusations, complaints and information about (a) non-compliance with legal and normative provisions applicable to the company, in addition to internal regulations and codes, (b) accounting issues, (c) internal controls, and (d) audit matters; as well as ensuring specific procedures to guarantee confidentiality and to protect whistleblower anonymity and the rights of the investigated party; - providing its opinion and assistance to the Board of Directors in the hiring, compensation and removal of independent auditor services; - supervising the work of internal auditors, the area of internal controls and the area responsible for preparing the company's financial statements; - supervising and evaluating the work of the external auditors,

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
303A.08	Shareholders must be given the opportunity to vote on all equity-compensation plans and material revisions thereto, with limited exemptions set forth in the NYSE rules.	<p>in order to evaluate their independence, the quality of services provided and the suitability of services provided related to the needs of the company, and telling the company's management at any point to retain compensation of the external auditors; and</p> <ul style="list-style-type: none"> - monitoring and mediating disagreements between management and the independent auditors regarding the company's financial statements and the application of accounting principles, monitoring difficulties found by the auditors during the audit process, among others. <p>We have an internal audit function.</p>
303A.09	A listed company must adopt and disclose corporate governance guidelines that cover certain minimum specified subjects.	We have not published consolidated corporate governance guidelines. Notwithstanding, our bylaws, the internal rules of our Board of Directors and advisory committees, our Chief Executive Officer Succession Policy and/or our Nomination Policy address matters related to director qualification standards, director access to management and, as necessary and appropriate, independent advisors, Chief Executive Officer and management succession and annual performance of the Board.
303A.10	A listed company must adopt and disclose a code of business conduct and ethics for directors, officers and employees, and promptly disclose any waivers of the code for directors or executive officers.	We have adopted a Code of Conduct, which applies to our directors, officers and employees, interns, suppliers, and to our subsidiaries in Brazil and abroad, as well as to any person acting on behalf of Vale or its subsidiaries. We report each year in our annual report on Form 20-F any waivers of the code of conduct granted for directors or executive officers. Our code of conduct has a scope that is similar, but not identical, to that required for a U.S. domestic company under the NYSE rules.
303A.12	<p>a) Each listed company CEO must certify to the NYSE each year that he or she is not aware of any violation by the company of NYSE corporate governance listing standards.</p> <p>b) Each listed company CEO must promptly notify the NYSE in writing after any executive officer of the listed company becomes aware of any non-compliance with any applicable provisions of this Section 303A.</p> <p>c) Each listed company must submit an executed Written Affirmation</p>	We are subject to (b) and (c) of these requirements, but not (a).

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
	annually to the NYSE. In addition, each listed company must submit an interim Written Affirmation as and when required by the interim Written Affirmation form specified by the NYSE.	

CODE OF CONDUCT

We have a Code of Conduct that applies to the members of our Board of Directors and our Board of Executive Officers, including the chief executive officer and the chief financial officer, our employees, interns, suppliers, and to our subsidiaries in Brazil and abroad, as well as and any person acting on behalf of Vale or its subsidiaries.

Our Code of Conduct gathers the fundamental principles that underpin our business, and is part of Vale's Ethics & Compliance Program, which is monitored by the Audit Committee, the Conduct and Integrity Committee and the Audit and Compliance Department. Our Code of Conduct is now a principle-based document, which connects directly with our company's purpose and values.

We have published the Code of Conduct on our website, at: <http://www.vale.com> (under English Version/Investors/Corporate Governance/Policies). We have not granted any implicit or explicit waivers from any provision of our Code of Conduct since its adoption.

Whistleblower Channel

Any breaches of our policies and standards can be reported by anyone, including employees, contractors, suppliers, members of affected communities and other stakeholders, via our Whistleblower Channel, which is available in 8 languages. Our Whistleblower Channel is managed by our Audit and Compliance Department, an independent department that reports directly to the Board of Directors. Our Whistleblower Channel is structured to guarantee confidentiality and to protect whistleblower anonymity and the rights of the investigated party.

In 2021, our Whistleblower Channel received 6,248 reports and closed 5,526 cases, of which (i) 793 referred to allegations that were not investigated due to lack of information or pertinence to the scope of the Whistleblower Channel, (ii) 1,438 were complaints and consultations, which were answered by the Whistleblower Channel, but did not lead to an investigation, and (iii) 3,295 led to investigations, which confirmed violations of Vale's Code of Conduct in 41.4% of these cases. All confirmed violations triggered correction plans, which are presented by managers and approved by the Whistleblower Channel. As a general rule, these plans contain measures to promote process improvements, training initiatives and feedback to employees. Depending on the seriousness of the allegations, employees involved may be subject to administrative measures, such as warnings, suspensions or terminations. Suppliers involved in serious violations of the Code of Conduct are also subject to punitive measures, such as fines or contract termination.

Investigations by Vale's Whistleblower Channel in 2021 resulted in 3,014 corrective actions, including actions for dismissal of 157 employees.

Further information on the Whistleblower Channel is disclosed in our Ethics & Compliance annual report, available in our website, at: <http://www.vale.com> (under English Version/Investors/Information to the market/Annual reports/Tax Transparency Report). Information in our website is not incorporated by reference in this annual report on Form 20-F.

PRINCIPAL ACCOUNTANT FEES AND SERVICES

The following table summarizes the fees for professional services and other services rendered to us by our independent auditors PricewaterhouseCoopers Auditores Independentes Ltda. ("PwC") in 2021 and 2020.

	<i>Year ended December 31,</i>	
	2021	2020
	<i>(US\$ thousand)</i>	
Audit fees	5,860	5,851
Audit-related fees	81	286
Other fees	-	-
Total fees	5,941	6,137

"Audit fees" are the aggregate fees of PwC for the audit of our annual financial statements, the audit of the statutory financial statements of our subsidiaries, and reviews of interim financial statements and attestation services that are provided in connection with statutory and regulatory filings or engagements. They also include fees for services that only the independent auditor reasonably can provide, including the provision of comfort letters and consents in connection with statutory and regulatory filings and the review of documents filed with the SEC and other capital markets or local financial reporting regulatory bodies. "Audit-related fees" are fees charged by PwC for assurance and related services that are reasonably related to the performance of the audit or review of our financial statements and are not reported under "Audit fees."

INFORMATION FILED WITH SECURITIES REGULATORS

We are subject to various information and disclosure requirements in those countries in which our securities are traded, and we file financial statements and other periodic reports with the CVM, B3 and the SEC.

Brazil. Vale's Common Shares are listed on B3 in São Paulo, Brazil. As a result, we are subject to the information and disclosure requirements of Brazilian Corporate Law, as amended. We are also subject to the periodic disclosure requirements of CVM rules applicable to listed companies and to B3's "Novo Mercado" Corporate Governance Requirements. Our CVM filings are available from the CVM at <http://www.cvm.gov.br> or from B3 at <http://www.b3.com.br>. In addition, they may be accessed at our website, <http://www.vale.com>.

United States. As a result of our ADSs being listed on the New York Stock Exchange, we are subject to the information requirements of the Securities Exchange Act of 1934, as amended, and accordingly file reports and other information with the SEC. Reports and other information filed by us with the SEC available to the public from the SEC at <http://www.sec.gov>. In addition, as with all of our security filings, they may be accessed at our website, <http://www.vale.com>. Such filings and other information on our website are not incorporated by reference in this annual report on Form 20-F. You may also inspect Vale's reports and other information at the offices of the New York Stock Exchange, 11 Wall Street, New York, New York 10005, on which Vale's ADSs are listed. For further information on obtaining copies of Vale's public filings at the New York Stock Exchange, you should call (212) 656-5060.

EXHIBITS

<u>Exhibit Number</u>	
1	Bylaws of Vale S.A., as of March 12, 2021 (incorporated by reference to Exhibit 1 to Vale's annual report on Form 20-F dated March 23, 2021 (File Nos. 001-15030, Accession No. 0001047469-21-000687)).
2	Description of Securities registered under Section 12 of the Exchange Act
4.1	Framework Agreement, dated March 2, 2016, by and among Vale S.A., BHP Billiton Brasil Ltda, Samarco Mineração S.A., the Federal Government of Brazil, the states of Espirito Santo and Minas Gerais and certain other public authorities in Brazil (incorporated by reference to Exhibit 4.12 to BHP Billiton Ltd.'s annual report on Form 20-F dated September 21, 2016 (File Nos. 001-09526 and 001-31714, Accession No. 0001193125-16-715037))
4.2	Integral Reparation Agreement, dated February 4, 2021, by and among Vale S.A., the Government of the State of Minas Gerais, the Public Defender Office of the State of Minas Gerais, public prosecutors of the State of Minas Gerais and federal prosecutors (incorporated by reference to Exhibit 4.1 to Vale's annual report on Form 20-F dated March 23, 2021 (File Nos. 001-15030, Accession No. 0001047469-21-000687)).
8	List of subsidiaries
12.1	Certification of Chief Executive Officer of Vale pursuant to Rules 13a-14 and 15d-14 under the Securities Exchange Act of 1934
12.2	Certification of Chief Financial Officer of Vale pursuant to Rules 13a-14 and 15d-14 under the Securities Exchange Act of 1934
13.1	Certification of Chief Executive Officer and Chief Financial Officer of Vale, pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
15.1	Consent of PricewaterhouseCoopers Auditores Independentes Ltda. (PCAOB ID 1351)
15.2	Consents of Qualified Persons for Technical Report Summary for Serra Norte Operations
15.3	Consents of Qualified Persons for Technical Report Summary for Serra Sul Operations
15.4	Consents of Qualified Persons for Technical Report Summary for Sudbury Operations
15.5	Consents of Qualified Persons for Technical Report Summary for Salobo Operations
17.1	Guarantors and Issuers of Guaranteed Securities
96.1	Technical Report Summary for Serra Norte Operations
96.2	Technical Report Summary for Serra Sul Operations
96.3	Technical Report Summary for Sudbury Operations
96.4	Technical Report Summary for Salobo Operations (incorporated by reference to our current report Form 6-K dated March 31, 2022 (File Nos. 001-15030, Accession No. 0001104659-22-040322))
101	Interactive Data File
104	Cover Page Interactive Data File

The amount of long-term debt securities of Vale or its subsidiaries authorized under any individual outstanding agreement does not exceed 10% of Vale's total assets on a consolidated basis. Vale hereby agrees to furnish the SEC, upon its request, a copy of any instruments defining the rights of holders of its long-term debt or of its subsidiaries for which consolidated or unconsolidated financial statements are required to be filed.

GLOSSARY

Alumina	Aluminum oxide. It is the main component of bauxite, and extracted from bauxite ore in a chemical refining process. It is the principal raw material in the electro-chemical process from which aluminum is produced.
Aluminum	A white metal that is obtained in the electro-chemical process of reducing aluminum oxide.
Austenitic stainless steel	Steel that contains a significant amount of chromium and sufficient nickel to stabilize the austenite microstructure, giving to the steel good formability and ductility and improving its high temperature resistance. They are used in a wide variety of applications, ranging from consumer products to industrial process equipment, as well as for power generation and transportation equipment, kitchen appliances and many other applications where strength, corrosion and high temperature resistance are required.
B3	B3 S.A.—Brasil, Bolsa, Balcão (formerly BM&FBOVESPA), a stock exchange located in São Paulo, Brazil.
Bauxite	A rock composed primarily of hydrated aluminum oxides. It is the principal ore of alumina, the raw material from which aluminum is made.
Beneficiation	A variety of processes whereby extracted ore from mining is reduced to particles that can be separated into ore-mineral and waste, the former suitable for further processing or direct use.
CFR	Cost and freight. Indicates that all costs related to the transportation of goods up to a named port of destination will be paid by the seller of the goods.
Class 2	Low purity nickel, containing higher levels of deleterious elements and predominantly iron-bearing, that is primarily destined to the stainless steel market
Coal	Coal is a black or brownish-black solid combustible substance formed by the decomposition of vegetable matter without access to air. The rank of coal, which includes anthracite, bituminous coal (both are called hard coal), sub-bituminous coal, and lignite, is based on fixed carbon, volatile matter, and heating value.
Cobalt	Cobalt is a hard, lustrous, silver-gray metal found in ores, and used in the preparation of magnetic, wear-resistant, and high-strength alloys (particularly for jet engines and turbines). Its compounds are also used in the production of inks, paints, catalysts and battery materials.
Coke	Coal that has been processed in a coke oven, for use as a reduction agent in blast furnaces and in foundries for the purposes of transforming iron ore into pig iron.
Coking coal	Hard coking coal is the highest value segment of the metallurgical coal market segments (see metallurgical coal) because of its high strength factors to form a strong coke.
Concentration	Physical, chemical or biological process to increase the grade of the metal or mineral of interest.
Copper	A reddish brown metallic element. Copper is highly conductive, both thermally and electrically. It is highly malleable and ductile and is easily rolled into sheet and drawn into wire.
Copper anode	Copper anode is a metallic product of the converting stage of smelting process that is cast into blocks and generally contains 99% copper grade, which requires further processing to produce refined copper cathodes.
Copper cathode	Copper plate with purity higher than or equal to 99.9% that is produced by an electrolytic process.
Copper concentrate	Material produced by concentration of copper minerals contained in the copper ore. It is the raw material used in smelters to produce copper metal.
Cut-off-Grade	Cut-Off grade is the grade (i.e., the concentration of metal or mineral in rock) that determines the destination of the material during mining. For purposes of establishing “prospects of economic extraction,” the cut-off grade is the grade that distinguishes material deemed to have no economic value (it will not be mined in underground mining or if mined in surface mining, its destination will be the waste dump) from material deemed to have economic value (its ultimate destination during mining will be a processing facility). Other terms used in similar fashion as cut-off grade include “net smelter return”, “pay limit”, and “break-even stripping ratio”.

CVM	The <i>Comissão de Valores Mobiliários</i> (Brazilian Securities and Exchange Commission).
DWT	Deadweight ton. The measurement unit of a vessel's capacity for cargo, fuel oil, stores and crew, measured in metric tons of 1,000 kg. A vessel's total deadweight is the total weight the vessel can carry when loaded to its maximum permitted load line.
Electrowon copper cathode	Refined copper cathode is a metallic product produced by an electrochemical process in which copper is recovered from an electrolyte and plated onto an electrode. Electrowon copper cathodes generally contain 99.99% copper grade.
Ferroalloys	Manganese ferroalloys are alloys of iron that contain one or more other chemical elements. These alloys are used to add these other elements into molten metal, usually in steelmaking. The principal ferroalloys are those of manganese, silicon and chromium.
FOB	Free on board. It indicates that the purchaser pays for shipping, insurance and all the other costs associated with transportation of the goods to their destination.
Gold	A precious metal sometimes found free in nature, but usually found in conjunction with silver, quartz, calcite, lead, tellurium, zinc or copper. It is the most malleable and ductile metal, a good conductor of heat and electricity and unaffected by air and most reagents.
Grade	The proportion of metal or mineral present in ore or any other host material.
Hematite Ore	Hematite is an iron oxide mineral, but also denotes the high-grade iron ore type within the iron deposits.
Inferred Mineral Resource	Is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. The level of geological uncertainty associated with an inferred mineral resource is too high to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Because an inferred mineral resource has the lowest level of geological confidence of all mineral resources, which prevents the application of the modifying factors in a manner useful for evaluation of economic viability, an inferred mineral resource may not be considered when assessing the economic viability of a mining project, and may not be converted to a mineral reserve.
Indicated Mineral Resource	Is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of adequate geological evidence and sampling. The level of geological certainty associated with an indicated mineral resource is sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Because an indicated mineral resource has a lower level of confidence than the level of confidence of a measured mineral resource, an indicated mineral resource may only be converted to a probable mineral reserve.
Iron ore pellets	Agglomerated ultra-fine iron ore particles of a size and quality suitable for particular iron making processes. Our iron ore pellets range in size from 8 mm to 18 mm.
Itabirite ore	Itabirite is a banded iron formation and denotes the low-grade iron ore type within the iron deposits.
Limonite	An iron and aluminium oxides rich horizon formed by decomposition of pre-existing rocks within a surface weathering environment.
Lower Class I	High purity nickel, containing lower levels of deleterious elements, that is used in low premium applications (e.g., foundry)
Lump ore	Iron ore or manganese ore with the coarsest particle size in the range of 6.35 mm to 50 mm in diameter, but varying slightly between different mines and ores.
Manganese ore	A hard brittle metallic element found primarily in the minerals pyrolusite, hausmannite and manganite. Manganese ore is essential to the production of virtually all steels and is important in the production of cast iron.

Measured Mineral Resource	Is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of conclusive geological evidence and sampling. The level of geological certainty associated with a measured mineral resource is sufficient to allow a qualified person to apply modifying factors, as defined in this section, in sufficient detail to support detailed mine planning and final evaluation of the economic viability of the deposit. Because a measured mineral resource has a higher level of confidence than the level of confidence of either an indicated mineral resource or an inferred mineral resource, a measured mineral resource may be converted to a proven mineral reserve or to a probable mineral reserve.
Metallurgical coal.....	Coal used in the production of steel, comprising multiple segments, including hard coking coal (see hard coking coal), semi-hard coking coal, semi-soft coking coal, all used to produce coke to feed a blast furnace; and, PCI (pulverized coal injection) coal used for direct injection fuel source into the blast furnace (see PCI). A bituminous hard coal with a quality that allows the production of coke. Normally used in coke ovens for metallurgical purposes.
Mineral deposit(s)	A mineralized body that has been intersected by a sufficient number of closely spaced drill holes and/or underground/surface samples to support sufficient tonnage and grade of metal(s) or mineral(s) of interest to warrant further exploration-development work.
Mineral reserve.....	Is an estimate of tonnage and grade or quality of indicated and measured mineral resources that, in the opinion of the qualified person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted.
Mineral resource.....	Is a concentration or occurrence of materials of economic interest in or on the Earth's crust in such form, grade or quality, and quantity that there are reasonable prospects for economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cut-off grade, likely mining dimensions, location or continuity, that, with the assumed and justifiable technical and economic conditions, is likely to, in whole or in part, become economically extractable. It is not merely an inventory of all mineralization drilled or sampled
Mt.....	Million metric tons
Mtpy	Million metric tons per year.
Nickel	A silvery white metal that takes on a high polish. It is hard, malleable, ductile, somewhat ferromagnetic, and a fair conductor of heat and electricity. It belongs to the iron-cobalt group of metals and is chiefly valuable for the alloys it forms, such as stainless steel and other corrosion-resistant alloys.
Nickel laterite	Deposits are formed by intensive weathering of olivine-rich ultramafic rocks such as dunite, peridotite and komatiite.
Nickel matte.....	An intermediate smelter product that must be further refined to obtain pure metal.
Nickel pig iron	A low-grade nickel product, made from lateritic ores, suitable primarily for use in stainless steel production. Nickel pig iron typically has a nickel grade of 1.5-6% produced from blast furnaces. Nickel pig iron can also contain chrome, manganese, and impurities such as phosphorus, sulfur and carbon. Low-grade ferro-nickel (FeNi) produced in China through electric furnaces is often also referred to as nickel pig iron.
Nickel sulfide.....	Formed through magmatic processes where nickel combines with sulfur to form a sulfide phase. Pentlandite is the most common nickel sulfide ore mineral mined and often occurs with chalcopyrite, a common copper sulfide mineral.
Ntk.....	Net ton (the weight of the goods being transported excluding the weight of the wagon) kilometer.
Open-pit mining	Method of extracting rock or minerals from the earth by their removal from an open pit. Open-pit mines for extraction of ore are used when deposits of commercially useful minerals or rock are found near the surface; that is, where the overburden (surface material covering the valuable deposit) is relatively thin or the material of interest is structurally unsuitable for underground mining.
Oxides	Compounds of oxygen with another element. For example, magnetite is an oxide mineral formed by the chemical union of iron with oxygen.

Palladium.....	A silver-white metal that is ductile and malleable, used primarily in automobile-emissions control devices, and electrical applications.
PCI.....	Pulverized coal injection. Type of coal with specific properties ideal for direct injection via the tuyeres of blast furnaces. This type of coal does not require any processing or coke making, and can be directly injected into the blast furnaces, replacing lump cokes to be charged from the top of the blast furnaces.
Pelletizing.....	Iron ore pelletizing is a process of agglomeration of ultra-fines produced in iron ore exploitation and concentration steps. The three basic stages of the process are: (i) ore preparation (to get the correct fineness); (ii) mixing and balling (additive mixing and ball formation); and (iii) firing (to get ceramic bonding and strength).
PGMs.....	Platinum group metals. Consist of platinum, palladium, rhodium, ruthenium, osmium and iridium.
Phosphate.....	A phosphorous compound, which occurs in natural ores and is used as a raw material for primary production of fertilizer nutrients, animal feeds and detergents.
Pig iron.....	Product of smelting iron ore usually with coke and limestone in a blast furnace.
Platinum.....	A dense, precious, grey-white transition metal that is ductile and malleable and occurs in some nickel and copper ores. Platinum is resistant to corrosion and is used primarily in jewelry, and automobile-emissions control devices.
Precious metals.....	Metals valued for their color, malleability, and rarity, with a high economic value driven not only by their practical industrial use, but also by their role as investments. The widely-traded precious metals are gold, silver, platinum and palladium.
Primary nickel.....	Nickel produced directly from mineral ores.
Probable mineral reserves.....	Is the economically minerable part of an indicated and, in some cases, a measured mineral resource.
Proven mineral reserves.....	Is the economically minerable part of a measured mineral resource and can only result from conversion of a measured resource.
Real, reais or R\$.....	The official currency of Brazil is the <i>real</i> (singular) (plural: <i>reais</i>).
ROM.....	Run-of-mine. Ore in its natural (unprocessed) state, as mined, without having been crushed.
Saprolite.....	Clay-rich horizon formed by decomposition of pre-existing rocks within a surface weathering environment.
Secondary or scrap nickel.....	Stainless steel or other nickel-containing scrap.
Seaborne market.....	Comprises the total ore trade between countries using ocean bulk vessels.
Silver.....	A ductile and malleable metal used in photography, coins and medal fabrication, and in industrial applications.
Sinter feed (also known as fines).....	Iron ore fines with particles in the range of 0.15 mm to 6.35 mm in diameter. Suitable for sintering.
Sintering.....	The agglomeration of sinter feed, binder and other materials, into a coherent mass by heating without melting, to be used as metallic charge into a blast furnace.
Slab.....	The most common type of semi-finished steel. Traditional slabs measure 10 inches thick and 30-85 inches wide (and average 20 feet long), while the output of the recently developed "thin slab" casters is two inches thick. Subsequent to casting, slabs are sent to the hot-strip mill to be rolled into coiled sheet and plate products.
Stainless steel.....	Alloy steel containing at least 10% chromium and with superior corrosion resistance. It may also contain other elements such as nickel, manganese, niobium, titanium, molybdenum, copper, in order to improve mechanical, thermal properties and service life. It is primarily classified as austenitic (200 and 300 series), ferritic (400 series), martensitic, duplex or precipitation hardening grades.
Thermal coal.....	A type of coal that is suitable for energy generation in thermal power stations, cement plants and other coal fired ovens/kilns in general industry.

GLOSSARY

Tpy.....	Metric tons per year.
Troy ounce.....	One troy ounce equals 31.103 grams.
Underground mining	Mineral exploitation in which extraction is carried out beneath the earth's surface.
Upper Class I.....	High purity nickel, containing lower levels of deleterious elements, that is used in high premium applications (e.g., plating and super alloys)
U.S. dollars or US\$	The United States dollar.

SIGNATURES

The registrant hereby certifies that it meets all of the requirements for filing on Form 20-F and that it has duly caused and authorized the undersigned to sign this annual report on its behalf.

VALE S.A.

By: /s/ Eduardo de Salles Bartolomeo
Name: Eduardo de Salles Bartolomeo
Title: Chief Executive Officer

By: /s/ Gustavo Duarte Pimenta
Name: Gustavo Duarte Pimenta
Title: Chief Financial Officer

Date: April 14, 2022
