

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, 2017  
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)

Luciano Siani Pires, Chief Financial Officer

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Praia de Botafogo 186 – offices 701 – 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	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	New York Stock Exchange
4.625% Guaranteed Notes due 2020, issued by Vale Overseas	New York Stock Exchange
5.875% Guaranteed Notes due 2021, issued by Vale Overseas	New York Stock Exchange
4.375% Guaranteed Notes due 2022, issued by Vale Overseas	New York Stock Exchange
6.250% Guaranteed Notes due 2026, issued by Vale Overseas	New York Stock Exchange
8.250% Guaranteed Notes due 2034, issued by Vale Overseas	New York Stock Exchange
6.875% Guaranteed Notes due 2036, issued by Vale Overseas	New York Stock Exchange
6.875% Guaranteed Notes due 2039, issued by Vale Overseas	New York Stock Exchange
5.625% Notes due 2042, issued by Vale S.A.	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, 2017 was:  
5,197,432,081 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 and posted on its corporate website, if any, every Interactive Data File required to be submitted and posted 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 and post such files).  
Yes  No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, or a non-accelerated filer. See definition of "accelerated filer" and "large accelerated filer" in Rule 12b-2 of the Exchange Act. (Check one):

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.

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.

Item 17  Item 18

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

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 701-1901 – Botafogo, 22250-145 Rio de Janeiro, RJ, Brazil, and its telephone number is 55-21-3485-5000.

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.

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.

## BUSINESS OVERVIEW

### SUMMARY

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

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,					
	2015		2016		2017	
	(US\$ million)	(% of total)	(US\$ million)	(% of total)	(US\$ million)	(% of total)
<b>Ferrous minerals:</b>						
Iron ore	12,330	52.7%	15,784	57.4%	18,524	54.5%
Pellets	3,600	15.4	3,827	13.9	5,653	16.7
Ferroalloys and manganese	162	0.7	302	1.1	469	1.4
Other ferrous products and services	470	2.0	438	1.6	483	1.4
Subtotal	16,562	70.8	20,351	74.0	25,129	74.0
Coal	526	2.3	839	3.1	1,567	4.6
<b>Base metals:</b>						
Nickel and other products(1)	4,693	20.1	4,472	16.3	4,667	13.7
Copper(2)	1,470	6.3	1,667	6.0	2,204	6.5
Subtotal	6,163	26.4	6,139	22.3	6,871	20.2
Other(3)	133	0.5	159	0.6	400	1.2
<b>Total net operating revenues from continuing operations</b>	<b>23,384</b>	<b>100.0%</b>	<b>27,488</b>	<b>100.0%</b>	<b>33,967</b>	<b>100.0%</b>

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

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

(3) Includes energy.

### Ferrous minerals:

- *Iron ore and iron ore pellets.* We operate four systems in Brazil for producing and distributing iron ore, which we refer to as the Northern, Southeastern, Southern and Midwestern Systems. The Northern and the Southeastern Systems are fully integrated, consisting of mines, railroads, maritime terminals and a port. The Southern System consists of three mining complexes and two maritime terminals. We also have iron ore pellet operations in several locations, some of which are conducted through joint ventures. We currently operate nine pellet plants in Brazil and two in Oman. We also have a 50% stake in Samarco and 25% stakes in two pellet companies in China.
- *Ferroalloys and manganese.* We conduct our manganese mining operations through Vale S.A. and subsidiaries in Brazil, and we produce several types of manganese ferroalloys through a wholly owned subsidiary in Brazil.

### Base metals:

- *Nickel.* Our principal nickel mines and processing operations are conducted by our wholly owned subsidiary Vale Canada Limited ("Vale Canada"), which has operations in Canada, Indonesia and New Caledonia. We also have nickel operations in Onça Puma, in the Brazilian state of Pará. We also own and operate, or have interests in, nickel refining facilities in the United Kingdom, Japan, China, South Korea and Taiwan.
- *Copper.* In Brazil, we produce copper concentrates at Sossego and Salobo, in Carajás, in the Brazilian state of Pará. In Canada, we produce copper concentrates, copper matte and

copper cathodes in conjunction with our nickel mining operations at Sudbury and Voisey's Bay.

- *Cobalt, PGMs and other precious metals.* We produce cobalt as a byproduct of our nickel mining and processing operations in Canada and refine it at our Port Colborne facilities, in the Province of Ontario, Canada. We began producing refined cobalt in our Long Harbour facilities in Newfoundland and Labrador in 2017. We also produce cobalt as a byproduct of our nickel operations in New Caledonia. We produce PGMs as byproducts of our nickel mining and processing operations in Canada. The PGMs are concentrated at our Port Colborne facilities. We produce gold and silver as byproducts of our nickel mining and processing operations in Canada, and gold as a byproduct of our copper mining at Sossego and Salobo in Brazil.

### Coal:

- We conduct our coal operations primarily in Mozambique, through Vale Moçambique S.A. ("Vale Moçambique"), where we are ramping up our metallurgical and thermal coal operations. We also have a minority interest in a Chinese coal producer.

### Logistics infrastructure:

- We are a leading operator of logistics services in Brazil and other regions of the world, with railroads, maritime terminals, distribution centers and ports. Two of our four iron ore systems include an integrated railroad network linked to port and terminal facilities. We also have an interest in MRS Logística S.A. ("MRS"), which transports our iron ore products from the Southern System mines to our maritime terminals, and VLI S.A. ("VLI"), which provides integrated logistics solutions to general cargo through railroads, inland and maritime terminals in Brazil. We are ramping up the logistics infrastructure to support our coal operations in Southeastern Africa. We own and charter dry bulk vessels to transport the products that we sell on a cost and freight ("CFR") basis to customers.

## BUSINESS STRATEGY

Our mission is to transform natural resources into prosperity and sustainable development. With this purpose, we are committed to:

- Sustainability;
- Improving our margins in the iron ore business;
- Preserving optionality in our nickel business and increasing production of our copper assets;
- Leveraging our mine and logistics in the coal business;
- Decreasing our net debt level to US\$10 billion; and
- Enhancing corporate governance.

Below are the highlights of our major business strategies.

### *Commitment to sustainability*

We are committed to becoming a sustainability benchmark through a comprehensive approach based on systematic planning and execution, prioritizing risk and impact management (seeking to achieve zero harm to our employees and surrounding communities) and establishing a positive social, economic and environmental legacy in the places where we operate. Below is a list of measures illustrating our commitment to sustainability:

- Since 2013, environmental and social actions are directly incorporated into our strategic planning. In 2017, we joined the International Council on Mining and Metals (ICMM), the most important association in the mining industry, reaffirming our commitment to sustainable development. Also in 2017, we joined the Task Force on Climate-related Financial Disclosures (TCFD). The purpose of the TCFD is to create a set of recommendations to improve the quality of voluntary disclosure of climate-related information.
- We are committed to reducing water use in our activities by investing in technologies and initiatives to control total water withdrawal, especially by promoting water reuse. In 2017, we withdrew a total of 276.3 billion liters of water, and used 179.5 billion liters in our operations (including discontinued operations), with the balance being allocated to third parties. From the total volume of water used in 2017, 83% or 148.9 billion liters was reused.
- We are committed to improving the health and safety of our workers. Our total recordable injury frequency performance in 2017 was 2.0 per million hours worked, slightly higher than the frequency of 1.89 per million hours worked recorded in the previous year, although demonstrating a 24% improvement over the last five years.
- We follow standards for social action in accordance with international guidelines, including principles on business and human rights, which are based on the Guiding Principles on Business and Human Rights of the United Nations Human Rights Council.
- In July 2016, we, together with Samarco and BHPB, established the Fundação Renova to develop and implement remediation and compensation programs over many years, in order to support the recovery of the areas and communities affected by the failure of Samarco's dam.

### *Improving our margins in the iron ore business*

We are committed to improving our margins in the iron ore business by achieving better price realization, based on adjustments to our product portfolio according to market demand and supply chain optimization. We are focusing our product line to capture industry trends, improving quality and productivity, controlling costs, strengthening our logistics infrastructure of railroads, ports, shipping and distribution centers, and strengthening relationships with customers. Our diversified portfolio of high-quality products, strong technical marketing strategy, efficient logistics and long-standing relationships with major customers will help us achieve this goal.

In September 2017, Vale inaugurated the global Integrated Operations Center (IOC) at the Aguas Claras mine. The IOC brings together various functions in the iron ore supply chain to support improvements in the planning processes from mine to port, including optimization of ship distribution and response to client demands. These improvements to our operations and sales planning are expected to lead to better sales price realization and product quality management.



We will continue to promote the Brazilian blend fines (BRBF), a product standard with silica (SiO<sub>2</sub>) content limited to 5%, offering strong performance in any kind of sintering operation. We produce BRBF by 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. It is blended and sold in our Teluk Rubiah Maritime Terminal in Malaysia and in twelve distribution centers in China. This process reduces the time needed to reach Asian markets and increases our distribution capillarity by allowing the use of smaller vessels. The blending strategy also permits the use of iron ore with lower concentration, particularly from the Southern System, 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 and reduce the use of water in our operations.

### ***Preserving optionality in our nickel business and increasing production of our copper assets***

Our strategy for our nickel business is to preserve optionality. We are the world's largest nickel producer, with large-scale, long-life and low-cost operations, a substantial resource base and diversified mining operations that produce nickel from nickel sulfide and laterite sources using advanced technology. We are transitioning to a smaller footprint in our nickel business by calibrating investments and production to reflect current market conditions, such as the reduction of production volume at Voisey's Bay while a mine expansion project is being reassessed. In the long term, the battery segment shows important upside potential as electric vehicle production continues to attract significant investments, which could positively affect nickel price and our nickel premiums. We continue to optimize our operations and to review our asset utilization, aiming to increase productivity and improve returns.

A key aspect of our strategy for our copper assets in the Carajás region is to improve efficiency and asset utilization while we evaluate opportunities to extend our operations at Sossego and expand Salobo. These copper mines benefit from our infrastructure facilities serving the Northern System. The gold we produce at Sossego and Salobo increases the total aggregated value of those operations.

### ***Leveraging our mine and logistics in the coal business***

We have been increasing our coal production, mainly through the ramp-up of a new coal handling processing plant (CHPP) in the Moatize operations and the ramp-up of the Nacala Logistics Corridor (NLC) in Mozambique and Malawi, where we have entered into a strategic partnership with Mitsui. As we complete the ramp-up of our new CHPP in Moatize and the NLC, we expect our costs to diminish, enhancing the competitiveness of our coal operations.

### ***Reducing net debt***

Our goal is to reduce indebtedness to US\$10 billion by the end of 2018, taking advantage of our cash flow generation. This level of net debt will enable us to withstand cycles in the mining business while maintaining a solid balance sheet and an investment-grade credit rating.

### ***Enhancing corporate governance***

Following the conversion of our class A preferred shares into common shares, in December 2017, we completed our listing on the Novo Mercado segment of the B3 exchange (formerly BM&FBovespa), the special listing segment of B3 for companies committed to the highest standards of corporate governance. Also in 2017, our shareholders elected two independent board members to the Board of Directors. We are committed to continuing to improve our corporate governance.

## REORGANIZATION OF OUR SHAREHOLDING STRUCTURE AND LISTING ON NOVO MERCADO

In 2017, we successfully completed a series of measures to simplify our shareholding structure and enhance our corporate governance. Below is a summary of these measures:

- In August 2017, we concluded a voluntary conversion of our class A preferred shares into common shares and the exchange of preferred American Depositary Shares into common American Depositary Shares. A total of 84.4% of the total outstanding class A preferred shares (including class A preferred shares underlying preferred American Depositary Shares) were converted into common shares (including common shares underlying common American Depositary Shares).
- In August 2017, we concluded the merger of our former controlling shareholder Valepar S.A. (“Valepar”) into Vale, and the former shareholders of Valepar became direct shareholders of Vale.
- In August 2017, shareholders’ amendments to our bylaws became effective to provide for: (i) at least 20% of our board of directors to be composed of independent directors; (ii) mandatory tender offer to all shareholders in case of sale of control, (iii) mandatory tender offer in case any shareholder or group of shareholders acquires common shares in an amount equal to or greater than 25% of our total common shares; (iv) any disputes between us and our shareholders to be resolved by arbitration before the B3 arbitration chamber.
- In October 2017, our shareholders approved the mandatory conversion of the remaining class A preferred shares into common shares, which was successfully completed in November 2017. Following the completion of the mandatory conversion, we no longer have class A preferred shares, and our capital stock is composed of common shares and the 12 golden shares owned by the Brazilian government.
- On December 22, 2017, we completed our listing on the Novo Mercado segment of the B3 exchange (formerly BM&FBovespa), the special listing segment of B3 for companies committed to the highest standards of corporate governance.

In August 2017, upon conclusion of the merger of Valepar into Vale, certain former shareholders of Valepar entered into a Shareholders’ Agreement pursuant to which they undertake, among other things, to vote jointly on certain key matters. This Shareholders’ Agreement is expected to expire in November 2020. See *Share ownership and trading—Major shareholders*.

## SIGNIFICANT CHANGES IN OUR BUSINESS

We summarize below major events related to our divestitures, acquisitions and other significant developments in our business since the beginning of 2017.

### *Dispositions and asset sales*

We are always seeking to optimize the structure of our portfolio of businesses in order to achieve the most efficient allocation of capital. We summarize below our most significant dispositions since the beginning of 2017.

- *Sale of Fertilizer Business*—In January 2018, we completed the sale to The Mosaic Company (“Mosaic”) of a substantial part of our fertilizer business, which includes (i) our phosphate assets in Brazil; (ii) our stake in the joint venture that operates the phosphate rock mine in Bayóvar, Peru; (iii) our potash assets located in Brazil; and (iv) our potash project based in Canada (Kronau). The contractual consideration was US\$1.150 billion in cash (US\$1.080 billion following customary working capital adjustments), and approximately 34.2 million shares of Mosaic’s common stock, which corresponds to approximately 8.9% (on a post-issuance basis) of Mosaic’s outstanding common stock. Subject to limited exceptions, the Mosaic shares to be issued to us cannot be transferred for two years following closing. We have the right to appoint two members of Mosaic’s board of directors, one of whom must be independent, for so long as we hold at least 90% of the Mosaic shares received at closing, or one member of Mosaic’s board for so long as we hold at least 50% of the Mosaic shares received at closing. We appointed Mr. Luciano Siani to Mosaic’s board of directors, and will appoint another director at Mosaic’s next annual shareholders’ meeting.
- *Sale of Cubatão assets*—On November 17, 2017, we entered into a share purchase agreement with Yara International ASA to sell our wholly owned subsidiary, Vale Cubatão Fertilizantes Ltda., which owns and operates the nitrogen and phosphate assets located in Cubatão, Brazil. The purchase price is US\$255 million to be paid in cash upon the closing of the transaction, which is expected to occur in the second quarter of 2018. Consummation of the transaction is subject to the satisfaction of various conditions precedent, including the approval of the Brazilian antitrust authority (CADE).
- *Sale of very large ore carriers*—In August 2017 and in December 2017, we sold a total of four very large ore carriers of 400,000 deadweight tons (“DWT”) for an aggregate amount of US\$356 million to Bank of Communications Finance Leasing Co., Ltd. (Bocomm). With the completion of these sales, we no longer own any very large ore carriers of 400,000 DWT in our fleet. In addition, we also sold two floating transfer stations for an aggregate amount of US\$35 million.
- *Sale of Lubambe*.—In December 2017, we sold our 50% interest in the joint venture that owned 80% of Lubambe copper mine, in Zambia, to EMR Capital Bidco (No.2C) Limited for US\$42 million.

### **Partnership in coal assets in Mozambique**

We have a partnership with Mitsui in coal assets in Mozambique. In March 2017, we completed the equity transaction with Mitsui, which consisted of: (i) the sale of 15% of our 95% stake in the Moatize coal mine, (ii) the sale of 50% of Vale’s stake in the NLC and (iii) a long-term facility by Mitsui to NLC. We received US\$690 million upon completion of the equity transaction in March 2017, and US\$87 million in the first quarter of 2018 upon closing of the project financing described below.

In November 2017, the NLC entities entered into agreements for a project financing in the total amount of US\$2.730 billion, as follows:

- US\$1.030 billion provided by Japan Bank for International Cooperation (JBIC);
- US\$1.000 billion loan insured by Nippon Export and Investment Insurance (NEXI), provided by Sumitomo Mitsui Banking Corporation; The Bank of Tokyo Mitsubishi UFJ Ltd; Mizuho Bank Limited; Sumitomo Mitsui Trust Bank Limited; Nippon Life Insurance Company and Standard Chartered Bank;

- US\$400 million loan insured by Export Credit Insurance of South Africa Limited (ECIC), provided by ABSA Bank Limited; Investec Bank Limited; Rand Merchant Bank and The Standard Bank of South Africa Limited;
- US\$300 million provided by the African Development Bank (AfDB).

The transaction closed in February 2018 and we received the proceeds of the project financing in March 2018. Vale received US\$2.6 billion in proceeds, in repayment of certain shareholders loans provided for construction of NLC, net of certain commissions paid by NLC. The project financing will be repaid in 14 years with the proceeds obtained from the tariff charged by NLC in connection with its provision of coal transportation services and general cargo services.

### *Optimizing our base metals operations in Canada*

We are optimizing our nickel operations across Canada, as part of an overall strategy to prioritize value over volume, reduce our atmospheric emissions and comply with local regulations. In 2018, we will phase out our smelting and refining activities in Thompson, where we will focus on nickel concentrate production. As a result, we will concentrate more of our refining and smelting activities in Sudbury, where we will focus on the production of copper concentrate, copper matte and refined nickel. In Long Harbour, we produce nickel rounds, copper cathode and cobalt rounds.

- *Sudbury, Ontario*—In the second half of 2017, we converted our two-furnace operation in Sudbury into a single furnace operation. As a result of this change, we expect to increase the proportion of production of copper concentrate to total copper production from the current rate of 66% in 2017 to close to 73% in 2018, maximizing the smelter capacity for nickel. In addition, we ceased production of copper anode and increased production of copper matte. By the end of 2018, we expect that about 15% of our copper production will be sold in the form of copper matte. We rebuilt one of the operational furnaces from March 2017 to June 2017, followed by the permanent shutdown of the other furnace. The rebuilt furnace had its capacity increased, but due to the single furnace operation, overall smelter production in the long term will decrease by approximately 30%.
- *Thompson, Manitoba*—We intend to change our operations in Thompson, Manitoba, from an integrated operation to a mine-mill operation. We permanently shut down one of the two smelter furnaces at the site in 2017, and we expect to decommission the other furnace in 2018, therefore closing the remaining smelting and refining activities to focus the operation solely on nickel concentrate production. We plan to send the majority of the feed from Thompson to be refined in Sudbury and Long Harbour.
- *Voisey's Bay and Long Harbour, Newfoundland and Labrador*—In 2017, we shipped a greater proportion of Voisey's Bay nickel concentrate to our Long Harbour processing facility, reducing concentrate shipments to our Sudbury and Thompson operations. Starting in 2018, all Voisey's Bay nickel concentrate is being shipped to our Long Harbour refinery. Our Long Harbour processing facilities produce nickel rounds, copper cathode and cobalt rounds from the Voisey's Bay concentrate.

### ***Resumption of operations of São Luis and Tubarão I and II pellet plants***

In January 2018, we resumed the operations of our Tubarão II pellet plant. We expect to resume operations at the Tubarão I and São Luis pellet plants in the second and third quarters of 2018. The operations of these plants had been suspended since 2012 due to market conditions.

## **FAILURE OF SAMARCO'S TAILINGS DAM IN MINAS GERAIS**

### ***Samarco's dam failure***

In November 2015, the Fundão tailings dams owned by Samarco S.A. failed, releasing tailings downstream, flooding certain communities and causing impacts on communities and the environment along the Doce river. The failure 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"), a Brazilian subsidiary of BHP Billiton plc.

### ***Emergency actions***

Immediately after the dam failure, Samarco, together with the public authorities, provided first aid, food, water, housing, social assistance and financial aid to the affected families and individuals. As Samarco's shareholders, we were actively involved in supporting Samarco during this period. In addition to these emergency actions, Samarco has been monitoring the affected area, performing emergency work to contain any movement of tailings, reinforcing the structures of its dams and dikes to ensure the safety of the region and mitigating the environmental and social impacts of the event.

### ***Fundação Renova and the remediation process***

In August 2016, Samarco and its shareholders (Vale and BHPB) created the 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 collapse.

The social and economic remediation and compensation programs conducted by Fundação Renova include, among others:

- Registration of the impacted parties and assessment of the impact;
- Compensation and indemnification of the impacted parties;
- Resettlement of the communities of Bento Rodrigues, Paracatu de Baixo and Gesteira;
- Protection and recovery of life quality of impacted indigenous communities;
- Implementation of social and cultural activities and psychosocial support to people affected;
- Creation of permanent channels of communication and interaction with society;
- Recovery and reconstruction of houses, bridges and other damaged infrastructure;

- Recovery of schools and reintegration of school communities;
- Recovery of cultural property, leisure and sport areas and preservation of historical and cultural heritage;
- Development and implementation of programs to support agricultural and livestock farming, aquaculture, fishing, and other economic activities of the affected regions;
- Implementation of specific a program for the recovery of micro and small businesses;
- Development of emergency a financial aid program to the affected population.

The environmental remediation and compensation programs conducted by Fundação Renova include, among others:

- Implementation of tailings retention and treatment systems in impacted rivers;
- Recovery of vegetation, regularization of gutters and margins of impacted rivers and measures to control erosion;
- Recovery of permanent preservation areas and springs in the Doce River basin;
- Assessment of impacts on water quality and aquatic biodiversity, followed by actions for recovery and conservation of aquatic fauna;
- Construction and provision of resources for operational maintenance of wild animals screening and rehabilitation centers in Minas Gerais and Espírito Santo;
- Collection and sewage treatment;
- Improvement of water supply systems;
- Implementation of plans for emergency alert and support;
- Development of a permanent water and sediments monitoring program in the Doce River basin and in the sea area near the river's mouth.

The creation of Fundação Renova was provided for under the Agreement of Transaction and Conduct Adjustment (TTAC or Framework Agreement) signed in March 2016 by Vale, BHPB, Samarco, the Brazilian federal government, the two Brazilian states affected by the failure (Espírito Santo and Minas Gerais) and other governmental authorities. The Framework Agreement has a 15-year term, renewable for successive one-year periods until all the obligations under the Framework Agreement have been performed. The Framework Agreement does not provide for admission of civil, criminal or administrative liability for the Fundão dam failure. In January 2017, Samarco, Vale and BHPB entered into two preliminary agreements with the federal prosecution office (the "MPF") providing for, among other things, the appointment of experts selected by the MPF to review and monitor the remediation programs provided under the Framework Agreement. The preliminary agreements contemplate a potential revision in the remediation programs provided under the Framework Agreement, based on the findings of the experts selected by the MPF.

Under the Framework Agreement, Fundação Renova must be funded by Samarco. As Samarco is currently unable to resume its activities, we and BHPB have been funding the foundation and also providing funds directly to Samarco, to preserve its operations and to support Samarco's funding obligations. Samarco's funding obligations to Fundação Renova, pursuant to the Framework Agreement, are summarized below:

- R\$2.0 billion in 2016;
- R\$1.2 billion in 2017;
- R\$1.2 billion in 2018;
- From 2019 to 2021, Samarco will provide funding based on the amounts needed to implement the projects approved for each year, subject to an annual minimum of R\$800 million and an annual maximum of R\$1.6 billion; and
- Starting in 2022, Samarco will provide the necessary funding in order to complete remaining programs approved for each year.

Fundação Renova must allocate a minimum annual amount of R\$240 million over 15 years to the implementation of compensation programs; these annual amounts are included in the annual contributions described above for the first six years.

Under the terms of the Framework Agreement, Fundação Renova must spend R\$500 million on sewage collection and treatment and solid waste disposal through the end of 2018.

Fundação Renova and Samarco allocated R\$1.7 billion to remediation and compensation programs in 2017, and have allocated R\$3.2 billion to these programs since their creation.

### ***Impact of dam failure on Samarco's operations***

Following the dam failure, governmental authorities ordered the suspension of Samarco's operations. Samarco's management is working on a plan that would permit it to obtain the necessary licenses and approvals to resume operations and provide a long-term solution for the disposal of tailings. The feasibility, timing and scope of measures necessary to resume Samarco's operations remain uncertain. With the exception of the Fundão tailings dam and the Santarém water dam, which was impacted by the overflow of tailings from the Fundão dam, all other production assets owned by Samarco were undamaged.

### ***Impact of the failure of Samarco's tailings dam in our financial statements***

For a discussion of the impact of the failure of Samarco's tailings dam in our financial statements, see *Operating and financial review and prospects—Failure of Samarco's tailing dams*.

### ***Legal proceedings***

For a discussion of the legal proceedings resulting from the failure of Samarco's tailings dam, see *Additional information—Legal proceedings*.

## SELECTED FINANCIAL DATA

The tables below present selected consolidated financial information as of and for the periods indicated. You should read this information together with our consolidated financial statements in this annual report.

### Consolidated statement of income data

	For the year ended December 31,				
	2013	2014	2015	2016	2017
	(US\$ million)				
Net operating revenues .....	43,953	35,124	23,384	27,488	33,967
Cost of goods sold and services rendered .....	(21,668)	(22,790)	(18,751)	(17,650)	(21,039)
Selling, general, administrative and other operating expenses, net .....	(1,101)	(2,059)	(819)	(774)	(951)
Research and evaluation expenses .....	(748)	(662)	(395)	(319)	(340)
Pre-operating and operational stoppage .....	(2,375)	(975)	(942)	(453)	(413)
Impairment and other results on non-current assets .....	(397)	(266)	(8,708)	(1,240)	(294)
Operating income (loss) .....	17,664	8,372	(6,231)	7,052	10,930
Non-operating income (expenses):					
Financial income (expenses), net .....	(8,314)	(6,018)	(10,654)	1,843	(3,019)
Equity results in associates and joint ventures .....	469	501	(445)	309	98
Impairment and other results in associates and joint ventures .....	14	(61)	(349)	(1,220)	180
Net income (loss) before income taxes .....	9,833	2,794	(17,679)	7,984	7,829
Income taxes .....	(6,889)	(1,603)	5,249	(2,781)	(1,495)
Net income (loss) from continuing operations .....	2,944	1,191	(12,430)	5,203	6,334
Net income (loss) attributable to non-controlling interests .....	(191)	(308)	(501)	(8)	21
Net income (loss) from continuing operations attributable to Vale's stockholders .....	3,135	1,499	(11,929)	5,211	6,313
Net income (loss) from discontinued operations attributable to Vale's stockholders .....	(2,551)	(842)	(200)	(1,229)	(806)
Net income (loss) attributable to Vale's stockholders .....	584	657	(12,129)	3,982	5,507
Net income (loss) attributable to non-controlling interests .....	(178)	(304)	(491)	(6)	14
Net income (loss) .....	406	353	(12,620)	3,976	5,521
Total cash paid to stockholders(1) .....	4,500	4,200	1,500	250	1,456

(1) Consists of total cash paid to stockholders during the period, whether classified as dividends or interest on stockholders' equity.

### Earnings (loss) per share

The table below shows our earnings (loss) per share. The earnings (loss) per share for 2013 to 2016 have been retrospectively adjusted to reflect the conversion of our Class A preferred shares into common shares, which was concluded in November 2017, as if the conversion had occurred at the beginning of the earliest year presented.

	For the year ended December 31,				
	2013	2014	2015	2016	2017
	(US\$, except as noted)				
Earnings (loss) per common share from continuing operations ..	0.60	0.29	(2.30)	1.00	1.21
Earnings (loss) per common share from discontinued operations ..	(0.49)	(0.16)	(0.03)	(0.23)	(0.16)
Earnings (loss) per common share .....	0.11	0.13	(2.33)	0.77	1.05
Weighted average number of shares outstanding (in thousands)(1)(2) .....	5,197,432	5,197,432	5,197,432	5,197,432	5,197,432
Distributions to stockholders per share(2) .....					
Expressed in US\$ .....	0.87	0.81	0.29	0.05	0.28
Expressed in R\$ .....	1.81	1.89	0.98	0.17	0.90

(1) Each common ADS represents one common share.

(2) Restated as if the conversion had occurred at the beginning of the earliest year presented.

(3) Our distributions to shareholders may be classified as either dividends or interest on shareholders' equity. In many years, part of each distribution has been classified as interest on shareholders' equity and part has been classified as dividends. For information about distributions paid to shareholders, see *Share ownership and trading—Distributions*.



## Balance sheet data

	As of December 31,				
	2013	2014	2015	2016	2017
			(US\$ million)		
Current assets .....	20,611	16,594	11,429	13,978	15,367
Non-current assets held for sale .....	3,766	3,640	4,044	8,589	3,587
Property, plant and equipment, net and intangible assets .....	88,536	84,942	59,426	62,290	63,371
Investments in associated companies and joint ventures .....	3,584	4,133	2,940	3,696	3,568
Non-current assets .....	8,100	7,180	10,653	10,461	13,291
Total assets .....	124,597	116,489	88,492	99,014	99,184
Current liabilities .....	9,164	10,626	10,438	10,142	11,935
Liabilities associated with non-current assets held for sale .....	448	111	107	1,090	1,179
Long-term liabilities(1) .....	22,379	22,043	15,896	19,096	20,512
Long-term debt(2) .....	27,670	27,388	26,347	27,662	20,786
Total liabilities .....	59,661	60,168	52,788	57,990	54,412
Stockholders' equity:					
Capital stock .....	60,578	61,614	61,614	61,614	61,614
Additional paid-in capital .....	(552)	(601)	(854)	(851)	(1,106)
Retained earnings and revenue reserves .....	3,299	(5,891)	(27,171)	(21,721)	(17,050)
Total Vale shareholders' equity .....	63,325	55,122	33,589	39,042	43,458
Non-controlling interests .....	1,611	1,199	2,115	1,982	1,314
Total stockholders' equity .....	64,936	56,321	35,704	41,024	44,772
Total liabilities and stockholders' equity .....	124,597	116,489	88,492	99,014	99,184

(1) Excludes long-term debt.

(2) Excludes current portion of long-term debt.

## 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:

- our direction and future operation;
- the implementation of our principal operating strategies, including our potential participation in acquisition, divestiture or joint venture transactions or other investment opportunities;
- the implementation of our financing strategy and capital expenditure plans;
- the exploration of mineral reserves and development of mining facilities;
- the depletion and exhaustion of mines and mineral reserves;
- 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 outcome of the various regulatory, governmental and legal proceedings in which we are involved;
- other factors or trends affecting our financial condition or results of operations; and
- the factors discussed under *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 (a) economic, political and social issues in the countries in which we operate, (b) the global economy, (c) commodity prices, (d) financial and capital markets, (e) the mining and metals businesses, which are cyclical in nature, and their dependence upon global industrial production, which is also cyclical, (f) regulation and taxation, (g) operational incidents or accidents, and (h) 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 *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

## EXTERNAL RISKS

***Our business is exposed to the cyclical nature of global economic activity and requires significant investments of capital.***

As a mining company, we are a supplier of industrial raw materials. Industrial production tends to be the most cyclical and volatile component of global economic activity, 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, expand and maintain production capacity, build infrastructure, preserve the environment 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.

Also, 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. Moreover, 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, iron ore pellets or nickel from joint ventures or unrelated parties 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, impairment of assets, and may adversely affect our cash flows, financial position and results of operations.

Demand for our iron ore, coal and nickel products depends on global demand for steel. Iron ore and iron ore pellets, which together accounted for 71.2% of our 2017 net operating revenues, are used to produce carbon steel. Nickel, which accounted for 13.7% of our 2017 net operating revenues, is used mainly to produce stainless and alloy steels. The prices of different steels 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.

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, 2017 by approximately US\$300 million. Average iron ore prices significantly

changed in the last five years, from US\$135 per dmt in 2013 to US\$97 per dmt in 2014, US\$55.5 per dmt in 2015, US\$58.5 per dmt in 2016 and US\$71.3 per dmt in 2017, according to the average Platts IODEX (62% Fe CFR China). On February 28, 2018, the year to date average Platts IODEX iron ore price was US\$76.60 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 the last few years. In 2017, Chinese demand represented 74% of global demand for seaborne iron ore, 55% of global demand for nickel and 48% of global demand for copper. The percentage of our net operating revenues attributable to sales to customers in China was 41.3% in 2017. Therefore, any contraction of China's economic growth could result in lower demand for our products, leading to lower revenues, cash flow and profitability. Poor performance in the Chinese real estate sector, the largest consumer of carbon steel in China, would also negatively impact our results.

***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 our 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 2017, we had net foreign exchange losses of US\$463 million, while we had net foreign exchange gains of US\$3.252 billion in 2016 and net foreign exchange losses of US\$7.044 billion in 2015. In addition, changing values of the Brazilian *real*, the Canadian dollar, the Australian dollar, the Euro, the Indonesian rupiah 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* (52% in 2017) and the Canadian dollar (12% in 2017), 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.

Significant volatility in currency prices 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.

## FINANCIAL RISKS

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

Lower 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, 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*.

***We may not be able to implement our strategy with respect to divestments and strategic partnerships.***

In the past few years, we have entered into agreements to dispose of assets and to make strategic partnerships, in order to optimize our business portfolio and implement our financing strategy and capital expenditure plans. We may continue to seek opportunities for divestments and strategic partnerships in the future. We are exposed to a number of risks in connection with these transactions, including imposition of regulatory conditions, inability to satisfy conditions for completion or for receipt of additional payments, and negative market reactions. If we are unable to complete our dispositions or strategic partnerships, we may have to revise our business and financing strategy and incur additional costs, which could in turn adversely affect our results of operations, financial conditions or reputation.

## **RISKS RELATING TO LEGAL PROCEEDINGS**

***We are involved in legal proceedings that could have a material adverse effect on our business in the event of unfavorable outcomes.***

We are involved in legal proceedings in which adverse parties have sought injunctions to suspend certain of our operations or claimed substantial amounts, including several legal proceedings and investigations relating to the failure of Samarco's Fundão tailings dam. Although we are vigorously contesting them, the outcomes of these proceedings are uncertain and may materially and adversely affect our business, our liquidity and the value of the securities issued by us or our subsidiaries. See *Additional information—Legal proceedings*.

***Our obligations and potential liabilities arising from the failure of a tailings dam owned by Samarco Mineração S.A. ("Samarco") in Minas Gerais could negatively impact our business, our financial conditions and our reputation.***

In November 2015, the Fundão tailings dam owned by Samarco failed, causing environmental damage in the surrounding area. The failure of Samarco's tailings dam has adversely affected and will continue to affect our business, and the full impact is still uncertain and cannot be estimated. Below is a discussion of the main effects of the dam failure on our business.

- *Legal proceedings.* We are involved in multiple legal proceedings and investigations relating to the failure of the Fundão tailings dam, and other proceedings and investigations may arise in the future. These proceedings include securities class actions in the United States against us and some of our officers, a criminal proceeding in Brazil, public civil actions brought by Brazilian authorities and multiple proceedings involving claims for significant amounts of damages and remediation measures. Adverse results in these proceedings may adversely impact our liquidity and our financial condition. See *Additional information—Legal proceedings*.
- *Reparation obligations and other undertakings.* In March 2016, Samarco and its shareholders (Vale and BHPB) entered into the Framework Agreement with certain governmental authorities, pursuant to which Samarco, Vale and BHPB agreed to create a foundation (Fundação Renova) to develop and implement long-term remediation and compensation programs. In January 2017, Samarco, Vale and BHPB entered into two preliminary agreements with the MPF providing for, among other things, the appointment of experts selected by the MPF to review and monitor the remediation programs provided under the Framework Agreement, the provision of collateral to secure certain remediation obligations, and a timetable for negotiation of a final agreement. The preliminary

agreements contemplate a potential revision in the remediation programs provided under the Framework Agreement, based on the findings of the experts selected by the MPF. As Samarco is currently unable to resume its activities, we and BHPB have been funding Fundação Renova and also providing funds directly to Samarco, to preserve its operations and to support certain remediation measures undertaken by Samarco. If Samarco is unable to resume operations or to generate sufficient cash flows to fund the remediation measures required under these agreements, we will be required to continue funding these remediation measures, which in turn may adversely affect our financial conditions and results of operations. See *Business overview—Failure of Samarco’s tailings dam in Minas Gerais*.

- *Risk of additional environmental damages.* 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. Failure to contain the remaining tailings could also impact the feasibility and timing for the restart of Samarco’s operations.
- *Other impacts.* We may encounter delays in the receipt of environmental and other licenses for our tailings dams and other facilities, and Brazilian authorities may impose more stringent conditions in connection with the licensing process of our projects and operations. Also, as one of Samarco’s shareholders, our reputation has been adversely affected by the failure of Samarco’s tailings dam.

## POLITICAL, ECONOMIC, SOCIAL AND REGULATORY RISKS

### *Political, economic and social conditions in the countries in which we have operations or projects 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, extortion, corruption, robbery, sabotage, kidnapping, civil strife, 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.

### *Political and economic instability in Brazil could adversely impact our business and the market price of our securities.*

The Brazilian 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 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;
- 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. In August 2016, the Brazilian Congress approved the impeachment of the Brazilian president. Also, ongoing corruption investigations have led to charges against former and current public officials, members of several major political parties and directors and officers of many Brazilian companies. In addition, Brazil's next presidential and federal legislative election will be in October 2018. We cannot predict the outcome of these elections or whether the elections will result in changes in Brazilian governmental and economic policies or in the Brazilian mining industry. Political instability and the upcoming elections may aggravate economic uncertainties in Brazil and increase volatility of securities of Brazilian issuers.

In the last years, Brazil faced an economic recession, adverse fiscal developments and political instability. Brazilian GDP grew by 1.0% in 2017, but declined by 3.6% in 2016 and by 3.85% in 2015. Unemployment rate was 12.7% in 2017, 11.5% in 2016 and 6.9% in 2015. Inflation, as reported by the consumer price index (IPCA), was 2.95% in 2017, 6.29% in 2016 and 10.67% in 2015. The Brazilian Central Bank's base interest rate (SELIC) was 7.00% on December 31, 2017, 13.75% on December 31, 2016 and 14.25% on December 31, 2015. 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.

***Disagreements with local communities in which we operate could adversely impact our business and reputation.***

Disputes with communities where we operate may arise from time to time. In some instances, our operations and mineral reserves are located on or near lands owned or used by indigenous people 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 groups, including indigenous groups, 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 otherwise hamper our ability to develop our reserves and conduct our operations. Protesters have taken actions to disrupt our operations and projects, and they may continue to do so in the future, which may harm our operations and could adversely affect our business. 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, 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* and *Additional information—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, 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 and concessions from governmental regulatory agencies 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. For more information on mining concessions and other similar rights, see *Information on the Company—Regulatory matters*.

## 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, HIV/AIDS 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.

***Our business could be adversely affected by the failure of our counterparties, joint venture partners or joint ventures we do not control to perform their obligations.***

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

Important parts of our iron ore, pelletizing, nickel, coal, 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 partners or joint ventures to adopt adequate standards, controls and procedures could lead to higher costs, reduced production or environmental, 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 result in damage to, or destruction of, properties, facilities and equipment. 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 pollution or certain hazards or 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 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 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 10.8% of our total cost of goods sold in 2017. To fulfill our energy needs, we depend on the following sources: oil byproducts, which represented 32.0% of total energy needs in 2017, electricity (31.6%), natural gas (16.7%), coal (15.0%) and other energy sources (4.7%).

Electricity costs represented 4.6% of our total cost of goods sold in 2017. 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.

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

We rely heavily on information technology, operational technology and telecommunications systems for the operation of many of our business processes. Failures in those systems, whether caused by obsolescence, technical failures, negligence, accident or malicious acts, may result in the disclosure or theft of sensitive information, misappropriation of funds and disruptions to or interruption in our business operations. 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 information technology, operational technology, cybersecurity or telecommunications systems, or breaches of information security, may harm our reputation and have a material adverse effect on our operational performance, earnings and financial condition.

## HEALTH, SAFETY AND ENVIRONMENTAL RISKS

### *Our business is subject to environmental, health and safety incidents.*

Our operations involve the use, handling, storage, discharge and disposal of hazardous substances into the environment and the use of natural resources, and the mining industry is generally subject to significant risks and hazards, including fire, explosion, toxic gas leaks, spilling of polluting substances or other hazardous materials, rockfalls, incidents involving dams, failure of other operational structures and incidents involving mobile equipment, vehicles or machinery. This could occur by accident or by breach of operating and maintenance standards, and could result in a significant environmental and social impacts, damage to or destruction of mineral properties or production facilities, personal injury, illness or death of employees, contractors or community members close to operations, environmental damage, delays in production, monetary losses and possible legal liability. Additionally, in remote localities, our employees may be exposed to tropical and contagious diseases that may affect their health and safety. Notwithstanding our standards, policies and controls, our operations remain subject to incidents or accidents that could adversely affect our business, stakeholders or reputation.

### *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, services and projects 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 in order to get approval for our projects and permission for initiating construction. Significant changes to existing operations are also subject to these requirements. 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 and controls on activities relating to mineral research, mining, pelletizing activities, railway and marine services, ports, decommissioning, refining, distribution and marketing of our products. Such regulation may give rise to significant costs and liabilities. Litigation 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 has become stricter in recent years, and it is possible that more regulation or more aggressive enforcement of existing regulations will adversely affect us by imposing restrictions on our activities and products, creating new requirements for the issuance or renewal of environmental licenses, resulting in operation delays, raising our costs or requiring us to engage in expensive reclamation efforts.

It is possible that in certain of our iron ore mining operations or projects, we may be required to limit or modify our mining plans or to incur additional costs to preserve caves or to compensate for the impact on them, with potential consequences for production volumes, costs or reserves in our iron ore business. For more information about Brazilian environmental regulations related to caves, see *Information on the Company—Regulatory matters—Environmental regulations*.

In response to the failure of Samarco's tailings dam in Minas Gerais, additional environmental and health and safety laws and regulations may be forthcoming in Brazil and authorities may impose more stringent conditions in connection with the licensing process of our projects and operations. Also, we may encounter more stringent requirements for and delays in the receipt of environmental operating license for other tailings dams.

National policies and international regulations regarding climate change may affect a number of our businesses in various countries. The ratification of the Paris Agreement in 2016 increased international pressure for the establishment of a global carbon price, and on companies to adopt carbon pricing strategies. The pricing of greenhouse gas emissions may impact our operational costs, mainly through higher price for fossil fuels as mining is an energy intensive industry, and our cost of international freight. Consumption of coal, one of the products we sell, in particular, is facing pressure from international institutions due to its carbon intensity.

Regulatory initiatives at the national and international levels that affect our shipping practices could increase our costs or require us to make new capital expenditures.

***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 wind storms, 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 remains uncertain, but we are likely to experience changes in rainfall patterns, increased temperatures, water shortages, rising sea levels, increased storm frequency and intensity as a result of climate change, which may adversely affect our operations. On some occasions in recent years, we have determined that force majeure events have occurred due to effect of severe weather on our mining and logistics activities.

## **RISKS RELATING TO OUR MINING RESERVES**

***Our reserve estimates may materially differ from mineral quantities that we are actually able to recover; our estimates of mine life may prove inaccurate; and market price fluctuations and changes in operating and capital costs may render certain ore reserves uneconomical to mine.***

Our reported reserves are estimated quantities of ore and minerals that we have determined can be economically mined and processed under present and assumed future conditions. There are numerous uncertainties inherent in estimating quantities of reserves and in projecting potential future rates of mineral production, including factors beyond our control. Reserve reporting involves estimating deposits of minerals that cannot be measured in an exact manner, and the accuracy of any reserve estimate is a function of the quality of available data, engineering and geological interpretation and judgment. As a result, 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. Reserve estimates and estimates of mine life may require revisions based on actual production experience, projects, updated exploration drilling data and other factors. Lower market prices of minerals and metals, reduced recovery rates or increased operating and capital costs due to inflation, exchange rates, changes in regulatory requirements or other factors may render proven and probable reserves uneconomic to exploit and may ultimately result in a reduction of reserves. Such a reduction could affect depreciation and amortization rates and have an adverse effect on our financial performance.

***We may not be able to replenish our reserves, which could adversely affect our mining prospects.***

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 expansion or replacement of reserves depleted by current production. If we do not develop new reserves, we will not be able to sustain our current level of production beyond the remaining lives of our existing mines.

***The feasibility of new mineral projects may change over time.***

Once mineral deposits are discovered, it can take a number of years from the initial phases of drilling until production is possible, during which the economic feasibility of production may change. Substantial time and expenditures are required to:

- establish mineral reserves through drilling;
- determine appropriate mining and metallurgical processes for optimizing the recovery of metal contained in ore;
- obtain environmental and other licenses;
- construct mining, processing facilities and infrastructure required for greenfield properties; and
- obtain the ore or extract the minerals from the ore.

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. 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.

***We face rising extraction costs and investment requirements over time as reserves deplete.***

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 reserves, 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 OUR CORPORATE STRUCTURE**

***The shareholders that are party to our shareholders' agreement have significant power over Vale.***

On August 14, 2017, Litel Participações S.A. ("Litel"), Bradespar S.A. ("Bradespar"), Mitsui & Co., Ltd. ("Mitsui") and BNDES Participações S.A. ("BNDESPAR") entered into a shareholders' agreement pursuant to which they undertake to vote jointly on certain key matters (the "Shareholders' Agreement"). The Shareholders' Agreement is expected to expire on November 9, 2020. See *Share ownership and trading—Major shareholders*. On December 31, 2017, Litel, Bradespar, Mitsui and BNDESPAR together held 40.29% of our total capital stock. As long as no other shareholder or group of shareholders owns more shares than

the parties to the Shareholders' Agreement, these major shareholders may elect a majority of the members of the board of directors and control the outcome of certain actions requiring shareholder approval.

***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—Memorandum and articles of association—Common shares and golden shares*.

***Our governance and compliance processes may fail to prevent regulatory penalties and reputational harm.***

We operate in a global environment, and our activities extend over multiple jurisdictions and complex regulatory frameworks, with increasing enforcement activities worldwide. 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, accounting or governance standards. We may be subject to breaches of our code of ethics and conduct, anti-corruption policies and business conduct protocols and to instances of fraudulent behavior, corrupt practices and dishonesty by our employees, contractors or other agents. 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.

***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 (STJ—*Superior Tribunal de Justiça*), and confirmation will only be granted if the foreign judgment: (a) fulfills all formalities required for its enforceability under the laws of the country where it was issued; (b) was issued by a competent court after due service of process on the defendant, as required under applicable law; (c) is not subject to appeal; (d) does not conflict with a final and unappealable decision issued by a Brazilian court; (e) 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; (f) it does not cover matters subject to the exclusive jurisdiction of the Brazilian courts; and (g) 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 qualifying institutional foreign investors to buy and sell securities on the B3 and entitling 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 could be imposed in the future.

### ***ADR holders may not have all the rights of our shareholders, and may be unable to exercise 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. Also, 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.

### ***ADR holders may encounter difficulties in the exercise of voting rights.***

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 depositary. In practice, the ability of a holder of ADRs to instruct the depositary as to voting will depend on the timing and procedures for providing instructions to the depositary either directly or through the holder's custodian and clearing system. With respect to ADSs for which instructions are not received, the depositary may, subject to certain limitations, grant a proxy to a person designated by us.



***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 operations
  - 1.1.2 Iron ore production
  - 1.1.3 Iron ore pellets operations
  - 1.1.4 Iron ore pellets production
  - 1.1.5 Customers, sales and marketing
  - 1.1.6 Competition
- 1.2 Manganese ore and ferroalloys
  - 1.2.1 Manganese ore operations and production
  - 1.2.2 Ferroalloys operations and production
  - 1.2.3 Manganese ore and ferroalloys: sales and competition

#### 2. Base metals

- 2.1 Nickel
  - 2.1.1 Operations
  - 2.1.2 Production
  - 2.1.3 Customers and sales
  - 2.1.4 Competition
- 2.2 Copper
  - 2.2.1 Operations
  - 2.2.2 Production
  - 2.2.3 Customers and sales
  - 2.2.4 Competition
- 2.3 PGMs and other precious metals
- 2.4 Cobalt

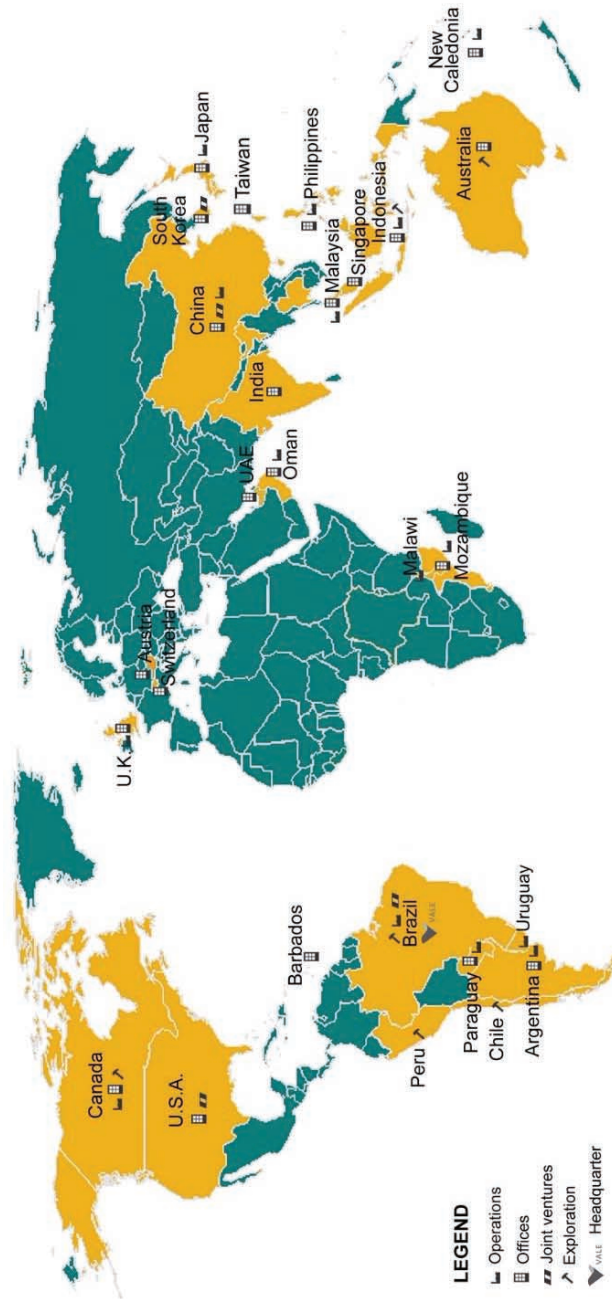
#### 3. Coal

- 3.1 Operations
- 3.2 Production
- 3.3 Customers and sales
- 3.4 Competition

#### 4. Infrastructure

- 4.1 Logistics
  - 4.1.1 Railroads
  - 4.1.2 Ports and maritime terminals
  - 4.1.3 Shipping
- 4.2 Energy

#### 5. Other investments



## 1. Ferrous minerals

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

### 1.1 Iron ore and iron ore pellets

#### 1.1.1 Iron ore operations

We conduct our iron ore business in Brazil primarily at the parent-company level, and through our subsidiaries Mineração Corumbaense Reunida S.A. (“MCR”) and Minerações Brasileiras Reunidas S.A.—MBR (“MBR”). 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 capabilities. We also conduct mining operations in the Midwestern System and we have a 50% stake in Samarco. Samarco’s operations have been suspended following the failure of one of its tailings dams located in Minas Gerais in November 2015 (see *Business overview—Failure of Samarco’s tailings dam in Minas Gerais*). We conduct each of our iron ore operations in Brazil under concessions from the federal government granted for an indefinite period, subject to the life of the mines.

Company/ Mining System	Location	Description/History	Mineralization	Operations	Power source	Access/Transportation
Vale Northern System . . . . .	Carajás, state of Pará	Divided into Serra Norte, Serra Sul and Serra Leste (Northern, Southern and Eastern ranges). Since 1984, we have been conducting mining activities in the northern range, which is divided into three main mining areas (N4W, N4E and N5) and two major beneficiation plants. In 2014, we started a new mine and beneficiation plant in Serra Leste. Our operations in Serra Sul, where our S11D project is located, started in 2016.	High-grade hematite ore type (iron grade of more than 65% on average).	Open-pit mining operations. In Serra Norte, one of the major plants applies the natural moisture beneficiation process, consisting of crushing and screening, and the other applies both the natural moisture and the wet beneficiation process in distinct lines. The 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 produces only sinter feed and Serra Leste produces lump and sinter feed.	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	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 the new 101-kilometers long railroad branch.
Southeastern System . . . . .	Iron Quadrangle, state of Minas Gerais	Three mining complexes: Itabira (two mines, with three major beneficiation plants), Minas Centrais (two mines, with two major beneficiation plants and one secondary plant) and Mariana (three mines, with two major beneficiation plants).	Ore reserves 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.	Open-pit mining operations. 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.	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	EFVM railroad connects these mines to the Tubarão port.

*Lines of Business*

Company/ Mining System	Location	Description/History	Mineralization	Operations	Power source	Access/Transportation
<i>Southern System</i> . . . . .	Iron Quadrangle, state of Minas Gerais	Three major mining complexes: Minas Itabirito (four mines and three major beneficiation plants); Vargem Grande (three mines and two major beneficiation plants); and Paraopeba (five mines and two major beneficiation plants).	Ore reserves with high ratios of itabirite ore type relative to hematite ore type. Itabirite ore 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.	Open-pit mining operations. 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.	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	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.
<i>Midwestern System</i> . . . .	State of Mato Grosso do Sul	Two mines and two plants located in the city of Corumbá.	Hematite ore type, which generates lump ore predominantly. Iron grade of 62% on average.	Open-pit mining operations. The beneficiation process for the run-of-mine consists of standard crushing and classification steps, producing lump ore and sinter feed.	Supplied through the national electricity grid. Acquired from regional utility companies or acquired through power purchase agreements.	Transported through barges traveling along the Paraguay river to ports in Argentina, and on to European and Asian markets from there, or delivered to customers at Corumbá.
<i>Samarco</i> . . . . .	Iron Quadrangle, state of Minas Gerais	Integrated system comprised of two mines, 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.	Itabirite ore type.	Open-pit mining operations. The three beneficiation plants, located at the site, process the run-of-mine by means of standard crushing, milling and concentration steps, producing pellet feed and sinter feed. Samarco's mining operations have been suspended following the failure of one of its tailings dams located in Minas Gerais in November 2015 (see <i>Business overview—Failure of Samarco's tailings dam in Minas Gerais</i> ).	Supplied through the national electricity grid. Acquired from regional utility companies or produced directly by Samarco.	Samarco's mines supply Samarco's pellet plants using three pipelines extending approximately 400 kilometers. These pipelines transport the iron ore from the beneficiation plants to the pelletizing plants. From the pelletizing plants to the Ubu port in the Brazilian state of Espírito Santo, pellets are transported by conveyor belts of approximately one kilometer.

### 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(2),			2017 process recovery(3)
		2015	2016	2017	
(million metric tons)					
<b>Southeastern System</b>					
Itabira .....	Open pit	35.6	33.4	37.8	50.9
Minas Centrais(1) .....	Open pit	41.3	40.9	37.6	67.6
Mariana .....	Open pit	36.1	28.4	33.1	85.4
Total Southeastern System .....		113.0	102.7	108.6	
<b>Southern System</b>					
Minas Itabirito .....	Open pit	41.4	40.1	36.8	82.1
Vargem Grande .....	Open pit	29.3	29.2	23.3	63.2
Paraopeba .....	Open pit	28.1	26.4	26.3	92.9
Total Southern System .....		98.8	95.7	86.4	
<b>Northern System</b>					
Serra Norte .....	Open pit	127.6	143.6	142.7	96.1
Serra Leste .....	Open pit	2.0	4.2	4.3	99.2
Serra Sul .....	Open pit	–	0.4	22.2	100.0
Total Northern System .....		129.6	148.1	169.2	
<b>Midwestern System</b>					
Corumbá .....	Open pit	2.8	1.9	2.4	67.9
Urucum .....	Open pit	1.7	0.4	0.0	0.0
Total Midwestern System .....		4.5	2.3	2.4	
Total Vale Systems .....		345.9	348.8	366.5	
Samarco(2)(3) .....	Open pit	12.7	0.0	0.0	
<b>Total</b> .....		<b>358.6</b>	<b>348.8</b>	<b>366.5</b>	

(1) Production figures include third-party ore purchases.

(2) For financial reporting purposes, Samarco is accounted for under the equity method. We have included production numbers from Samarco, adjusted to reflect our 50% equity interest, as the level of production and operating performance from entities accounted for under the equity method impacts our Adjusted EBITDA. Our use of Adjusted EBITDA is explained in—*Results of operations—Results of operations by segment—Adjusted EBITDA by segment*. Samarco operations are currently suspended following the Samarco dam failure as explained in—*Business overview—Failure of Samarco's tailings dam in Minas Gerais*.

(3) Process recovery figures do not include third-party ore purchases.

### 1.1.3 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. We also have a 25% interest in two iron ore pelletizing plants in China, *Zhuhai Yueyufeng Iron and Steel Co., Ltd* (“Zhuhai YPM”) and *Anyang Iron & Steel Co., Ltd* (“Anyang”). Our total estimated nominal capacity is 64.7 Mtpy, including the full capacity of our pelletizing plants in Oman, but not including our joint ventures Samarco, Zhuhai YPM and Anyang. We supply all of the iron ore requirements of our wholly owned pellet plants and part of the iron ore requirements for Samarco and Zhuhai YPM. In 2017, we sold 0.5 million metric tons of pellet feed to Zhuhai YPM. We suspended our sales of run-of-mine to Samarco following the failure of Samarco's tailings dam in November 2015.

Lines of Business

Company/Plant	Description/History	Nominal capacity (Mtpy)	Power source	Other information	Vale's equity interest (%)	Partners
<b>Brazil:</b>						
Vale Tubarão (state of Espírito Santo) .....	Three wholly owned pellet plants (Tubarão I, II and VIII) and five leased plants (Itabasco, Hispanobras, Kobrasco and two Nibrasco plants). These plants receive iron ore primarily from our Southeastern System mines and use our logistics infrastructure for distribution.	36.7 (1)	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	Operations at the Tubarão II pellet plant started up in January 2018, Tubarão I pellet plant is expected to restart operations in the first half of 2018 in response to market conditions. Operations at these plants have been suspended since 2012.	100.0	–
Fábrica (state of Minas Gerais) .....	Part of the Southern System. Receives iron ore from the Minas Itabirito mining complex, more specifically from João Pereira and Segredo mines. Production is mostly transported by MRS and EFVM.	4.5	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	–	100.0	–
Vargem Grande (state of Minas Gerais) .....	Part of the Southern System. Receives iron ore from the Minas Itabirito and Vargem Grande mining complexes, more specifically from Sapecado, Galinheiro, Capitão do Mato and Tamanduá mines. Production is mostly transported by MRS.	7.0	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	–	100.0	–
São Luís (state of Maranhão) .....	Part of the Northern System. Receives iron ore from the Carajás mines. Production is shipped to customers through our Ponta da Madeira maritime terminal.	7.5	–	Operation at the São Luís plant are expected to restart operations in the second half of 2018 in response to market conditions. Operations at this plant have been suspended since 2012.	100.0	–
Samarco .....	Four pellet plants, with aggregate nominal capacity of 30.5 Mtpy, located in the Ponta Ubu unit, in Anchieta, state of Espírito Santo.	30.5 (2)	Supplied through the national electricity grid. Acquired from regional utility companies or produced directly by Samarco.	In January 2016, Samarco suspended its pelletizing operations as pelletizing feed became unavailable as a result of the suspension of its mining operations in November 2015.	50.0	BHP Billiton Brasil Ltda.

*Lines of Business*

Company/Plant	Description/History	Nominal capacity (Mtpy)	Power source	Other information	Vale's equity interest (%)	Partners
<b>Oman:</b>						
Vale Oman Pelletizing Company LLC .....	Vale's industrial complex. Two pellet plants with a total nominal capacity of 9.0 Mtpy. The pelletizing plants are integrated with our distribution center that has a nominal capacity of 40.0 Mtpy.	9.0	Supplied through the national electricity grid.	Oman plants are supplied by iron ore from the Iron Quadrangle state of Minas Gerais through the Tubarão Port (80%) and by iron ore from Carajás through the Ponta de Madeira maritime terminal (20%).	70.0	Oman Oil Company S.A.O.C.

- (1) Our environmental operating licenses for the Tubarão pellet plants provide for a capacity of 36.2 Mtpy.  
 (2) The actual capacity will be revised based on the conditions under which Samarco resumes operations.



### 1.1.4 Iron ore pellets production

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

Company	Production for the year ended December 31,		
	2015	2016	2017
	(million metric tons)		
Vale(1) .....	46.2	46.2	50.3
Samarco(2) .....	12.3	0.0	0.0
Total .....	58.5	46.2	50.3

- (1) Figure indicates actual production, including full production from our pellet plants in Oman and the five pellet plants we lease in Brazil. The operating leases for the Itabasco, Kobrasco and Hispanobras pellet plants expire in 2018, and the operating leases for the two Nibrasco pellet plants expire in 2019.
- (2) For financial reporting purposes, Samarco is accounted for under the equity method. We have included production numbers from Samarco, adjusted to reflect our 50% equity interest, as the level of production and operating performance from entities accounted for under the equity method impacts our Adjusted EBITDA. Our use of Adjusted EBITDA is explained in—*Results of operations—Results of operations by segment—Adjusted EBITDA by segment*. Samarco operations are currently suspended following the Samarco dam failure as explained in—*Business overview—Failure of Samarco’s tailings dam in Minas Gerais*.

### 1.1.5 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—Major factors affecting prices*.

In 2017, China accounted for 57% of our iron ore and iron ore pellet shipments, and Asia as a whole accounted for 71%. Europe accounted for 13%, followed by Brazil with 9%. Our ten largest customers collectively purchased 134 million metric tons of iron ore and iron ore pellets from us, representing 39% of our 2017 iron ore and iron ore pellet sales volumes and 39% of our total iron ore and iron ore pellet revenues. In 2017, no individual customer accounted for more than 7% of our iron ore and iron ore pellet shipments.

Of our total 2017 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 steels, each using different types of pellets. In 2017, the Asian market (mainly Japan), the European market and the Brazilian market 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 sales offices in St. Prex (Switzerland), Tokyo (Japan), Seoul (South Korea), Singapore, Dubai (UAE) and Shanghai (China), which support global sales by Vale International, and an office in Brazil, which supports sales to South America. 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 2017, we hedged part of our total exposure to bunker oil prices relating to our owned fleet and long-term contracts of affreightment connected to our FOB and CFR international and domestic sales. The 2017 hedge program was settled in 2017.

### 1.1.6 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, Rio Tinto Ltd ("Rio Tinto") and Fortescue Metals Group Ltd. We are competitive in the Asian market for two main reasons. 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. When market demand is strong, our quality differential generally becomes more valuable to customers. 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 enhance our ability to offer our products in the Asian market at competitive prices on a CFR basis, despite higher transportation 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 twelve 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. The resulting blend offers strong performance in any kind of sintering operation. It is blended and sold in our Teluk Rubiah Maritime Terminal in Malaysia and in twelve distribution centers in China, which reduces the time to reach Asian markets and increases our distribution capillarity by using smaller vessels.
- *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, but also 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. (“Gerdau”), 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 (former Quebec Cartier Mining Co.) and Bahrain Steel (former Gulf Industrial Investment Co.).

## **1.2 Manganese ore and ferroalloys**

### **1.2.1 Manganese ore operations and production**

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

Mining complex	Company	Location	Description/History	Mineralization	Operations	Power source	Access/Transportation
Azul .....	Vale S.A.	State of Pará	Open-pit mining operations and on-site beneficiation plant.	High- and medium-grade oxide-ores (24-46% manganese grade).	Crushing, scrubbing and classification steps, producing lumps and fines.	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	Manganese ore is transported by truck and EFC railroad to the Ponta da Madeira maritime terminal.
Morro da Mina ...	Vale Manganês	State of Minas Gerais	Open-pit mining operations and concentration plant.	Medium- and low-grade silicocarbonate ores (an average content of 30% manganese grade).	Crushing, screening and dense-heavy medium separation DMS / HMS process producing lumps to the Barbacena and Ouro Preto ferroalloy plants.	Supplied through the national electricity grid. Acquired from regional utility companies.	Manganese ore is transported by truck to the Barbacena and Ouro Preto ferroalloy plants.
Urucum .....	MCR	State of Mato Grosso do Sul	Underground mining operations and on-site beneficiation plant.	High-and medium-grade oxide ores (an average content of 46% manganese grade).	Crushing, scrubbing and classification steps, producing lumps and fines.	Supplied through the national electricity grid. Acquired from regional utility companies or acquired through power purchase agreements.	Manganese ore is transported by barge traveling along the Paraguay and Paraná rivers to transhippers at the Nueva Palmira port in Uruguay.

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 December 31,			2017 process recovery (%)
		2015	2016	2017	
		(million metric tons)			
Azul.....	Open pit	1.7	1.7	1.4	41.5
Morro da Mina(1).....	Open pit	–	0.0	0.1	60.0
Urucum .....	Underground	0.7	0.7	0.7	82.7
Total.....		2.4	2.4	2.2	

(1) We suspended operations at Morro da Mina in 2015 due to market conditions. We resumed operations in October 2016 to provide manganese ore to the Barbacena ferroalloy plant.

### 1.2.2 Manganese ferroalloys operations and production

We conduct our manganese ferroalloys business through our wholly owned subsidiary Vale Manganês. The production of manganese ferroalloys consumes significant amounts of electricity, which is provided through power purchase agreements.

We produce several types of manganese ferroalloys, such as high carbon and medium carbon ferro-manganese and ferro-silicon manganese.

Plant	Location	Description/History	Nominal capacity	Power source
Minas Gerais Plants . . . .	Cities of Barbacena and Ouro Preto	Barbacena has six furnaces, two of which are refining furnaces and a briquetting plant. Ouro Preto has three furnaces, two of which are currently not operating due to market conditions.	Barbacena: 66,000 tons per year (54,000 tons per year of ferro-silicon manganese and 12,000 tons per year of ferro-manganese medium carbon). Ouro Preto: 64,000 tons per year of ferro-silicon manganese.	Supplied through the national electricity grid. Acquired from Furnas—Centrais Elétricas S.A. through power purchase agreements.
Bahia Plant . . . . .	City of Simões Filho	Four furnaces, two converters and a sintering plant.	135,000 tons per year (42,000 tons per year of ferro-silicon manganese and 93,000 tons per year of high carbon ferro-manganese). The plant has a capacity to refine until 40,000 tons per year of ferro-manganese high carbon to produce ferro-manganese medium carbon alloy, according to market demand.	Supplied through the national electricity grid. Acquired from Companhia Hidrelétrica do São Francisco (CHESF) or through power purchase agreements.

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

Plant	Production for the year ended December 31(1),		
	2015	2016	2017
	(thousand metric tons)		
Barbacena . . . . .	6	48	58
Ouro Preto . . . . .	1	–	–
Simões Filho . . . . .	92	77	88
Total . . . . .	99	124	146

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

### 1.2.3 Manganese ore and ferroalloys: sales and competition

The markets for manganese ore and ferroalloys 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. The main suppliers of high-grade ores are located in South Africa, Gabon, Australia and Brazil. The main producers of low-grade ores are located in the Ukraine, China, South Africa, Ghana, Kazakhstan, India and Mexico.

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). Our lower-grade ores, especially those from Morro da Mina, are consumed internally in our ferroalloy smelters.

The manganese ferroalloy market is characterized by a large number of participants who compete primarily on the basis of price. Our competitors are located principally in countries that produce manganese ore or carbon steel. Potential entrants and substitutes come from silicon or chrome ferroalloys, which can occasionally shift their furnaces to manganese alloys, and from electrolytic manganese producers. Competitors may be either integrated smelters like us, who feed manganese ore from their own mines, or non-integrated smelters. The principal competitive factors in this market are the costs of manganese ore, electricity, logistics and reductants such as coke, coal and charcoal. We compete with both stand-alone and integrated producers.

Focusing mainly in the Brazilian, South and North American steelmaking customers, our ferroalloys operations also benefit from synergies with our iron ore sales, marketing, procurement and logistics activities. We buy our energy and coke supplies at reasonable market prices both through medium- and long-term contracts. Competitors in the Brazilian market are about a dozen smelters with capacities from five to 90 thousand tons per year, most of which are not integrated and some of which are customers of our manganese ores. We have a distinctive advantage in comparison to them in producing ferroalloys with higher manganese content.

## 2. BASE METALS

### 2.1 Nickel

#### 2.1.1 Operations

We conduct our nickel operations primarily through our wholly owned subsidiary Vale Canada, which operates two nickel production systems, one in the North Atlantic region and the other in the Asia Pacific region. We also produce copper as a coproduct in our nickel operations in Canada and, through Vale S.A., operate a third nickel production system, Onça Puma, in the South Atlantic region. Our nickel operations are set forth in the following table.

Company/Mining System	Location	Description/History	Operations	Mining title	Power source	Access/ Transportation
<i>North Atlantic:</i>						
Vale Canada .....	Canada — Sudbury, Ontario	Integrated mining, milling, smelting and refining operations to process ore into finished nickel with a nominal capacity of 66,000 metric tons of refined nickel per year and additional nickel oxide feed for the refinery in Wales and our nickel plants in Asia. Mining operations in Sudbury began in 1885. We acquired the Sudbury operations in 2006.	<ul style="list-style-type: none"> <li><i>Nickel.</i> Primarily underground mining operations with nickel sulfide ore bodies, which also contain some copper, cobalt, PGMs, gold and silver. We also process external feeds from third parties and from our Voisey's Bay operation. By the end of 2017, we ceased receiving Voisey's Bay feed in Sudbury. In addition to producing finished nickel in Sudbury, we ship a nickel oxide intermediate product to our nickel refinery in Wales for processing to final products. In September 2017, as part of our efforts to reduce sulfur dioxide and other air emissions to meet regulatory changes in Ontario and Manitoba, and to rationalize our smelting and refining assets across Canada, we modified our processes including switching to a single flash furnace in Sudbury.</li> <li><i>Copper.</i> We produce two intermediate copper products, copper concentrate and copper anode, and we also produce a finished electrowon copper cathode product. In September 2017, we switched to a single flash furnace in Sudbury, and as a result, we ceased copper anode production resulting in increased production of copper concentrate and copper matte.</li> </ul>	Patented mineral rights with no expiration date; mineral leases expiring between 2018 and 2037; and mining licenses of occupation with indefinite expiration date(1).	Supplied by Ontario's provincial electricity grid and produced directly by Vale via hydro generation.	Located by the Trans-Canada highway and the two major railways that pass through the Sudbury area. Finished products are delivered to the North American market by truck. For overseas customers, the products are loaded into containers and travel intermodally (truck/rail/containership) through both east and west coast Canadian ports.

*Lines of Business*

<b>Company/Mining System</b>	<b>Location</b>	<b>Description/History</b>	<b>Operations</b>	<b>Mining title</b>	<b>Power source</b>	<b>Access/ Transportation</b>
Vale Canada .....	Canada — Thompson, Manitoba	Integrated mining, milling, smelting and refining operations to process ore into finished nickel. We intend to phase out smelting and refining activities in Thompson during 2018. Thompson mineralization was discovered in 1956, and Thompson operations were acquired by us in 2006.	<ul style="list-style-type: none"> <li><i>Nickel</i>. Primarily underground mining operations with nickel sulfide ore bodies, which also contain some copper and cobalt. In 2017, we permanently shut down one of the two furnaces in Thompson and the other will be shut down in 2018. By the end of 2017, we had ceased processing Voisey's Bay feed in Thompson. Starting in the second half of 2018, we plan to send the majority of the nickel concentrate from Thompson to be refined in Sudbury and Long Harbour. Smelting and refining activities in Thompson are being phased out in 2018, primarily due to the capital costs associated with the federal sulfur dioxide emission limits defined under the pollution prevention plan under the Canadian Environmental Protection Act (CEPA), as well as to declining feed availability. We have secured an extension for implementation of our current sulfur dioxide emission reduction plan, which permits smelting and refining through 2018, subject to negotiated emission limits.</li> </ul>	Order in Council leases expiring between 2020 and 2025; mineral leases expiring in 2034.	Supplied by Manitoba's provincial utility company.	Finished products are delivered to market by truck in North America. For overseas customers, the products are loaded into containers and travel intermodally (truck/rail/containership) to final destination through both west coast and east coast Canadian ports.



*Lines of Business*

<b>Company/Mining System</b>	<b>Location</b>	<b>Description/History</b>	<b>Operations</b>	<b>Mining title</b>	<b>Power source</b>	<b>Access/ Transportation</b>
Vale Newfoundland & Labrador Limited .....	Canada — Voisey's Bay and Long Harbour, Newfoundland and Labrador	Integrated open-pit mining and milling operation at Voisey's Bay producing nickel and copper concentrates with refining of nickel concentrate at Long Harbour into finished metal products with an expected nominal capacity of approximately 50,000 metric tons of refined nickel per year upon ramp-up. Voisey's Bay's operations started in 2005 and was purchased by us in 2006.	Comprised of the Ovoid open pit mine, and deposits for underground operations at a later stage. We mine nickel sulfide ore bodies, which also contain copper and cobalt. The Long Harbour facility continued to ramp up in 2017 while processing feed from Voisey's Bay concentrate exclusively. In 2017, as a result of the continuing ramp-up of the Long Harbour nickel refinery, copper cathode and cobalt rounds were produced for the first time. The portion of mid-grade and high-grade concentrate not shipped to Long Harbour in 2017 was shipped to our Sudbury and Thompson operations for final processing (smelting and refining) while copper concentrate was sold to the market. Shipments of nickel concentrate to Sudbury and Thompson ceased at the end of 2017. We expect the ramp-up to continue at Long Harbour during 2018.	Mining lease expiring in 2027, with a right of further renewals for 10-year periods.	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.	The nickel and copper concentrates from Voisey's Bay are transported to the port by haulage trucks and then shipped by drybulk vessels to either overseas markets or to our Long Harbour and other Canadian operations for further refining.
Vale Europe Limited .....	U.K.— Clydach, Wales	Stand-alone nickel refinery (producer of finished nickel), with nominal capacity of 40,000 metric tons per year. The Clydach refinery commenced operations in 1902 and was acquired by us in 2006.	Processes a nickel intermediate product, nickel oxide, supplied from our Sudbury and Matsuzaka operations to produce finished nickel in the form of powders and pellets.	—	Supplied through the national electricity grid.	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.

*Lines of Business*

Company/Mining System	Location	Description/History	Operations	Mining title	Power source	Access/ Transportation
<i>Asia/Pacific</i>						
PT Vale Indonesia Tbk ("PTVI") .....	Indonesia — Sorowako, Sulawesi	Open cast mining area and related processing facility (producer of nickel matte, an intermediate product) with a nominal capacity of approximately 80,000 metric tons of nickel in matte per year. PTVI's shares are traded on the Indonesia Stock Exchange. We indirectly hold 59.27% of PTVI's share capital, Sumitomo Metal Mining Co., Ltd ("Sumitomo") holds 20.09%, Sumitomo Corporation holds 0.1% and the public holds 20.49%. PTVI was established in 1968, commenced its commercial operations in 1978 and was acquired by us in 2006.	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 80% of its production to our wholly owned subsidiary Vale Canada and 20% of its production to Sumitomo.	Contract of work expiring in 2025, entitled to two consecutive ten-year extensions, subject to approval of the Indonesian government. See <i>Regulatory matters—Mining rights and regulation of mining activities</i> .	Produced primarily by PTVI's low-cost hydroelectric power plants on the Larona River (there are currently three facilities). PTVI has thermal generating facilities in order to supplement its hydroelectric power supply with a source of energy that is not subject to hydrological factors.	Trucked approximately 55 km to the river port at Malili and then loaded onto barges in order to load break-bulk vessels for onward shipment.
Vale Nouvelle-Calédonie S.A.S ("VNC") .....	New Caledonia — Southern Province	Mining and processing operations (producer of nickel oxide, nickel hydroxide and cobalt carbonate). We hold 95% of VNC's shares and the remaining 5% is held by Société de Participation Minière du Sud Calédonien SAS ("SPMSC"). SPMSC has an obligation to increase its stake in VNC to 10% within two years after the startup of commercial production.	The ongoing ramp-up of our nickel operation in New Caledonia is expected to continue in the coming years. VNC utilizes a high-pressure acid leach process to treat limonitic laterite and saprolitic laterite ores. As part of the ramp-up, VNC is undertaking a review of the capacity of different units of the plant to identify and eliminate bottlenecks. We expect to continue to ramp up VNC over the next five to six years to reach nominal production capacity of 57,000 metric tons per year of nickel contained in nickel oxide, which will be further processed in our refineries in Asia, and hydroxide cake form (IPNM), and 4,500 metric tons of cobalt in carbonate form.	Mining concessions expiring between 2022 and 2051(2).	Supplied through the national electricity grid and by independent producers.	Products are packed into containers and are trucked approximately 4 km to Prony port and shipped by ocean container.

*Lines of Business*

<b>Company/Mining System</b>	<b>Location</b>	<b>Description/History</b>	<b>Operations</b>	<b>Mining title</b>	<b>Power source</b>	<b>Access/ Transportation</b>
Vale Japan Limited .....	Japan — Matsuzaka	Stand-alone nickel refinery (producer of intermediate and finished nickel), with a nominal capacity of 60,000 metric tons per year. We own 87.2% of the shares, and Sumitomo owns the remaining shares. The refinery was built in 1965 and was acquired by us in 2006.	Produces intermediate products for further processing in our refineries in Asia and the UK, and finished nickel products using nickel matte sourced from PTVI.	–	Supplied through the national electricity grid. Acquired from regional utility companies.	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.
Vale Taiwan Limited .....	Taiwan — Kaoshiung	Stand-alone nickel refinery (producer of finished nickel), with nominal capacity of 18,000 metric tons per year. The refinery commenced production in 1983 and was acquired by us in 2006.	Produces finished nickel for the stainless steel industry, primarily using intermediate products from our Matsuzaka and New Caledonian operations. The plant was put on care and maintenance during 2017.	–	Supplied through the national electricity grid. Acquired from regional utility companies.	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 Kaoshiung.
Vale Nickel (Dalian) Co., Ltd .	China — Dalian, Liaoning	Stand-alone nickel refinery (producer of finished nickel), with nominal capacity of 32,000 metric tons per year. We own 98.3% of the equity interest and Ningbo Sunhu Chemical Products Co., Ltd. owns the remaining 1.7%. The refinery commenced production in 2008.	Produces finished nickel for the stainless steel industry, primarily using intermediate products from our Matsuzaka and New Caledonian operations.	–	Supplied through the national electricity grid. Acquired from regional utility companies.	Product transported over public roads by truck and by railway to customers in China. It is also shipped in ocean containers to overseas and some domestic customers.

*Lines of Business*

<b>Company/Mining System</b>	<b>Location</b>	<b>Description/History</b>	<b>Operations</b>	<b>Mining title</b>	<b>Power source</b>	<b>Access/ Transportation</b>
<i>South Atlantic</i> Vale/Onça Puma .....	Brazil — Ourilândia do Norte, Pará	Mining and smelting operation producing a high-quality ferronickel for application within the stainless steel industry.	The Onça Puma mine is built on lateritic nickel deposits of saprolitic laterite ore. The operation produces ferronickel via the 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 restart the second line operations in light of market conditions and the associated business case.	Mining concession for indefinite period.	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	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.

- (1) We submitted applications for renewal of leases in Sudbury in 2016 and 2017 and the approval process is ongoing. All conditions required for the renewal have been fulfilled. This process usually takes a number of years, and we can continue to operate while the approval process is ongoing.
- (2) VNC has requested the renewal of some concessions that were scheduled to expire before 2018. All conditions required for the renewal have been fulfilled. This process usually takes a number of years and we can continue to operate while the approval process is ongoing.



## 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 mine product 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 and VNC operation in New Caledonia the production and average grade represents in-place ore production and does not include losses due to processing.

	2015(1)			2016(1)			2017(1)		
	Production	Grade		Production	Grade		Production	Grade	
		Copper	Nickel		Copper	Nickel		Copper	Nickel
<i>Ontario operating mines</i> .....									
Copper Cliff North.....	1,138	1.42	1.38	979	1.44	1.26	814	1.40	1.30
Creighton.....	774	2.00	2.33	832	2.17	2.76	595	2.91	3.17
Stobie.....	1,471	0.63	0.73	1,373	0.57	0.64	448	0.53	0.62
Garson.....	778	1.39	1.94	711	1.34	1.91	635	1.48	1.93
Coleman.....	1,309	2.95	1.56	1,209	3.76	1.47	1,007	3.76	1.53
Ellen.....	165	0.70	0.95	75	0.42	0.88	–	–	–
Totten.....	528	1.88	1.62	671	1.86	1.43	710	1.90	1.33
Total Ontario operations.....	6,164	1.64	1.46	5,850	1.84	1.47	4,210	2.18	1.65
<i>Manitoba operating mines</i> ...									
Thompson.....	1,163	–	1.82	1,140	–	1.97	1,229	–	1.94
Birchtree.....	564	–	1.47	503	–	1.36	329	–	1.30
Total Manitoba operations.....	1,727	–	1.71	1,643	–	1.78	1,557	–	1.81
<i>Voisey's Bay operating mines</i>									
Ovoid.....	2,328	1.51	2.57	2,392	1.44	2.62	2,378	1.44	2.56
<i>Sulawesi operating mines</i>									
Sorowako.....	4,694	–	1.99	4,708	–	1.93	4,569	–	1.89
<i>New Caledonia operating mines</i>									
VNC.....	2,561	–	1.41	2,919	–	1.53	3,030	–	1.47
<i>Brazil operating mines</i>									
Onça Puma.....	1,024	–	2.13	1,710	–	2.04	964	–	2.05

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

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,		
		2015	2016	2017
(thousand metric tons contained nickel)				
Sudbury.....	Underground	54.4	80.4	61.9
Thompson.....	Underground	24.8	26.5	23.0
Voisey's Bay(1).....	Open pit	53.0	49.0	51.8
Sorowako(2).....	Open cast	79.5	81.1	73.1
Onça Puma.....	Open pit	24.4	24.1	24.7
New Caledonia(3).....	Open pit	26.9	34.3	40.3
External(4).....	–	26.7	15.6	13.1
Total(5).....		290.6	311.0	288.2

(1) Includes finished nickel produced at Long Harbour, Sudbury and Thompson.

(2) These figures have not been adjusted to reflect our ownership. We have a 59.2% interest in PTVI, which owns the Sorowako mines.

(3) These figures have not been adjusted to reflect our ownership. We have a 95.0% interest in VNC.

(4) Finished nickel processed at our facilities using feeds purchased from unrelated parties.

(5) These figures do not include tolling of feeds for unrelated parties.

### 2.1.3 Customers and sales

Our nickel customers are broadly distributed on a global basis. In 2017, 45% of our refined nickel sales were delivered to customers in Asia, 24% to Europe, 24% to North America and 7% to 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.

Nickel is an exchange-traded metal, 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™ and Utility™ 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); and
- size (from micron powder particles to large full-sized cathodes)

In 2017, the principal end-use applications for nickel were:

- stainless steel (69% of global nickel consumption);

- non-ferrous alloys, alloy steels and foundry applications (17% of global nickel consumption);
- nickel plating (6% of global nickel consumption);
- batteries (3% of global nickel consumption); and
- specialty applications, such as chemicals and powder metallurgy (5% of global nickel consumption).

In 2017, 63% of our refined nickel sales were made into non-stainless steel applications, compared to the industry average for primary 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, based at our head office in Toronto (Canada). We also have sales and technical support distributed around the world with primary back offices in Singapore and Toronto (Canada) and have sales managers located in St. Prex (Switzerland), Paramus, New Jersey (United States) and at several sites throughout Asia. For information about demand and prices, see *Operating and financial review and prospects—Major factors affecting prices*.

#### 2.1.4 Competition

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

Our nickel deliveries represented 13% of global consumption for primary nickel in 2017. 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 and BHP Billiton. Together with us, these companies accounted for about 39% of global refined primary nickel production in 2017.

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—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 and our relatively low production costs.

## 2.2 Copper

### 2.2.1 Operations

We conduct our copper operations at the parent-company level in Brazil and through our subsidiaries in Canada.

Mining complex/Location	Location	Description/History	Mineralization/ Operations	Mining title	Power source	Access/Transportation
<b>Brazil:</b>						
Vale/Sossego .....	Carajás, state of Pará.	Two main copper ore bodies, Sossego and Sequeirinho, and a processing facility to concentrate the ore. Sossego was developed by Vale. Production started in 2004 and has a nominal capacity of approximately 93,000 tpy of copper in concentrates.	The copper ore is mined using the open-pit method, and the run-of-mine is processed by means of standard primary crushing and conveying, SAG milling (a semi-autogenous mill that uses a large rotating drum filled with ore, water and steel grinding balls to transform the ore into a fine slurry), ball milling, copper concentrate flotation, tailings disposal, concentrate thickening, filtration and load out.	Mining concession for an indefinite period.	Supplied through the national electricity grid. Produced directly by Vale or acquired through power purchase agreements.	We truck the concentrate to a storage terminal in Parauapebas and then transport it via the EFC railroad to the Itaqui Port in São Luis, state of Maranhão. We constructed an 85-kilometer road to link Sossego to Parauapebas.
Vale/Salobo .....	Carajás, state of Pará.	Salobo I processing plant started production in 2012 and has a total capacity of 12 Mtpy of ore processed. The open pit mine and mill concluded their ramp up in the fourth quarter of 2016 to a capacity of 24 Mtpy of ore processed with the full implementation of Salobo II expansion. Salobo I and II have a total capacity of approximately 197,000 tpy of copper in concentrates.	Our Salobo copper mine is mined using the open-pit method, and 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.	Mining concession for an indefinite period.	Supplied through the national electricity grid. Acquired through power purchase agreements.	We truck the concentrate to a storage terminal in Parauapebas and then transport it via the EFC railroad to the Itaqui Port in São Luis, state of Maranhão. We constructed a 90-kilometer road to link Salobo to Parauapebas.
<b>Canada:</b>						
Vale Canada.....	Canada — Sudbury, Ontario			See —Base metals—Nickel—Operations		
Vale Canada/ Voisey's Bay .....	Canada — Voisey's Bay, Newfoundland and Labrador			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 represents in-place ore production and does not include losses due to processing. For the annual production of copper as a coproduct in our nickel operations, see —*Base metals—Nickel—Production*.

	2015(1)		2016(1)		2017(1)	
	Production	Grade	Production	Grade	Production	Grade
<i>Brazil</i>						
Sossego .....	12,857	0.93	12,687	0.82	12,380	0.81
Salobo .....	44,296	0.62	57,279	0.62	61,573	0.63
Total .....	57,153	0.69	69,966	0.66	73,953	0.66

(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	Finished production by ore source for the year ended December 31,		
		2015	2016	2017
		(thousand metric tons)		
<i>Brazil:</i>				
Salobo .....	Open pit	155	176	193
Sossego .....	Open pit	104	93	100
<i>Canada: (as coproduct of nickel operations)</i>				
Sudbury .....	Underground	98	122	98
Voisey's Bay .....	Open pit	32	32	34
Thompson .....	Underground	1	3	2
External(1) .....	—	23	21	12
<i>Zambia:</i>				
Lubambe(2) .....	Underground	10	8	7
Total .....		424	453	446

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

(2) For financial reporting purposes, Lubambe is accounted for under the equity method. We have included production numbers from Lubambe, adjusted to reflect our 40% equity interest, as the level of production and operating performance from entities accounted for under the equity method impacts our Adjusted EBITDA. Our use of Adjusted EBITDA is explained in —*Results of operations—Results of operations by segment—Adjusted EBITDA by segment*. Vale sold its stake in the Lubambe mine in December 2017.

## 2.2.3 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 long-term contracts to customers in Europe and electrowon copper cathodes from Sudbury and Long Harbour in North America under short-term sales agreements.

## 2.2.4 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 Corporación Nacional del Cobre de Chile ("Codelco"), Aurubis AG, Jiangxi Copper Corporation Ltd., Glencore and Freeport McMoRan Copper & Gold Inc., 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 anode are intermediate products in the copper production chain. Both the concentrate and anode 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 and Antofagasta plc; each operating at the parent-company level or through subsidiaries. Our market share in 2017 was about 3.5% of the total custom copper concentrate market.

The copper anode/blister market is very limited; generally, anodes are produced to supply each company's integrated refinery. The trade in anodes/blister is limited to those facilities that have more smelting capacity than refining capacity or to those situations where logistics cost savings provide an incentive to source anodes from outside smelters. The largest competitors in the copper anode market in 2017 included Glencore, First Quantum Minerals Ltd, Codelco, and China Nonferrous Metals, each operating at the parent-company level or through subsidiaries.

### **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. We have a refinery in Acton, England, where we process our intermediate products, as well as feeds purchased from unrelated parties and toll-refined materials. As part of business optimization, we plan to close our Acton refinery in 2018. At such time, the PGM concentrates from our Canadian operations will be sold to third parties. Our base metals marketing department sells our own PGMs and other precious metals, as well as products from unrelated parties and toll-refined products, on a sales agency basis. 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.

In February 2013, we sold to Wheaton Precious Metals (formerly Silver Wheaton) 25% of the gold produced as a byproduct at our Salobo copper mine, in Brazil, for the life of that mine, and 70% of the gold produced as a byproduct at our Sudbury nickel mines, in Canada, for 20 years. In each of March 2015 and August 2016, we sold to Wheaton Precious Metals an additional 25% of the gold produced as a byproduct at our Salobo copper mine. In consideration for the August 2016 sale, we received an initial cash payment of US\$800 million, an option value of approximately US\$23 million from a reduction of the exercise price of the warrants of Wheaton Precious Metals held by Vale since 2013, and ongoing payments of the lesser of US\$400 per ounce (subject to a 1% annual inflation adjustment 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. See *Business overview—Significant changes in our business*. Pursuant to the gold stream contract, Wheaton Precious Metals received 280,000 oz. of gold in 2017.

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	2015	2016	2017
		(thousand troy ounces of contained metal)		
Sudbury(1):				
Platinum.....	Underground	154	166	144
Palladium .....	Underground	341	322	214
Gold(2) .....	Underground	89	98	74
Salobo:				
Gold(2) .....	Open pit	251	317	346
Sossego:				
Gold .....	Open pit	80	67	65

- (1) Includes metal produced from unrelated parties feed purchases. Includes production out of Ontario (Canada) and Acton (England) production. 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 Precious Metals.

## 2.4 Cobalt

We recover significant quantities of cobalt as a byproduct of our nickel operations. In 2017, we produced 1,675 metric tons of refined cobalt metal at our Port Colborne refinery, 1,231 metric tons of cobalt rounds at our Long Harbour refinery, 2,780 metric tons of cobalt in a cobalt-based intermediate product in New Caledonia, and our remaining cobalt production consisted of 125 metric tons of cobalt contained in other intermediate products (such as nickel concentrates). As a result of the ramp-up of VNC operations in New Caledonia, our production of cobalt intermediate as a byproduct of our nickel production is increasing. We sell cobalt on a global basis. Our cobalt metal is electro-refined at our Port Colborne refinery and has 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, as well as the manufacture of cobalt-based chemicals.

The following table sets forth information on our cobalt production.

Mine	Type	Finished production by ore source for the year ended December 31,		
		2015	2016	2017
(contained metric tons)				
Sudbury.....	Underground	751	882	840
Thompson .....	Underground	365	700	138
Voisey's Bay.....	Open pit	849	887	1,829
New Caledonia .....	Open pit	2,391	3,188	2,780
Others(1).....	—	177	143	224
Total .....		4,533	5,799	5,811

- (1) 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 24 metric tons in 2016 and 6 metric tons in 2017.

3. COAL

3.1 Operations

We produce metallurgical and thermal coal through our subsidiary Vale Moçambique, which operates the Moatize mine. We also have a minority interest in a Chinese company, Henan Longyu Energy Resources Co., Ltd. (“Longyu”).

Company/ Mining complex	Location	Description/History	Mineralization/ Operations	Mining title	Power source	Access/ Transportation
<i>Vale Moçambique</i>						
Moatize .....	Tete, Mozambique	Open-cut mine, which was developed directly by Vale. Operations started in August 2011 and are expected to reach a nominal production capacity of 22 Mtpy, considering the Moatize expansion, comprised of metallurgical and thermal coal and the Nacala Logistics Corridor ramp-up. Vale has an indirect 80.75% stake, Mitsui has an indirect 14.25% stake and the remaining is owned by Empresa Moçambicana de Exploração Mineira, S.A.	Produces metallurgical and thermal coal. Moatize’s main branded products are the Chipanga premium hard coking coal and Moatize Low Vol Premium hard coking coal, but there is operational flexibility for multiple products. The optimal product portfolio will come as a result of market trials. Coal from the mines is currently processed at a CHPP with a capacity of 4,000 metric tons per hour. An additional CHPP began production in August 2016, which increased feed capacity by additional 4,000 metric tons per hour.	Mining concession expiring in 2032, renewable thereafter.	Supplied by local utility company. Back up supply on site.	The coal is transported from the mine to the port at Nacala-à-Velha via the Nacala Logistics Corridor.

### 3.2 Production

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

Operation	Mine type	Production for the year ended December 31,		
		2015	2016	2017
(thousand metric tons)				
Metallurgical coal:				
Moatize(1) .....	Open-cut	3,401	3,480	6,953
Thermal coal:				
Moatize(1) .....	Open-cut	1,559	2,012	4,307

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

### 3.3 Customers and sales

Coal sales from our Moatize operations, in Mozambique, target global steel and energy markets, including Asia, Africa, Europe and the Americas. Our Chinese coal joint venture directs its sales into the Chinese domestic market.

### 3.4 Competition

The global coal industry comprises markets for black (metallurgical and thermal) and brown (lignite) coal, and is highly competitive.

The demand for steel, especially in Asia, underpins demand for metallurgical coal, while demand for electricity underpins demand for thermal coal. Lower steel exports from China and better global macro-economic data have helped steel demand elsewhere to recover, increasing seaborne coal demand and coking coal prices. High price levels incentivize producers to maximize production, especially in the United States, Canada and Australia. Weather and infrastructure issues in Australia in 2017 kept seaborne supply tight, but supply is expected to normalize in 2018 and set to rise year-on-year, increasing completion in the seaborne market.

Competitiveness in the coal industry is based primarily on the economics of production costs, coal quality, transportation costs and proximity to the market. Our key competitive strengths are completion of a new and competitive transportation corridor, proximity to the Atlantic and Indian markets (as compared to our main competitors) and the size and quality of our reserves.

Major participants in the seaborne coal market are subsidiaries, affiliates and joint ventures of BHP Billiton, Glencore, Anglo American, Rio Tinto, Teck, Peabody, PT Adaro Energy and the Shenhua Group, among others.

## 4. Infrastructure

### 4.1 Logistics

We have developed our logistics business based on the transportation needs of our mining operations and we also provide transportation services for other customers. We conduct our logistics businesses at the parent-company level and through subsidiaries and joint ventures, as set forth in the table below.

Company	Business	Location	Our share of capital		Partners
			Voting	Total	
Vale	Railroad (EFVM and EFC), port and maritime terminal operations	Brazil	–	–	–
VLI(1)	Railroad, port, inland terminal and maritime terminal operations. Holding of certain general cargo logistics assets	Brazil	37.6	37.6	FI-FGTS, Mitsui and Brookfield
MRS	Railroad operations	Brazil	46.8	48.2	CSN, Congonhas Minérios, Usiminas Participações e Logísticas, Gerdau, Railvest Investments and public investors.
CPBS	Port and maritime terminal operations	Brazil	100	100	–
PTVI	Port and maritime terminal operations	Indonesia	59.2	59.2	Sumitomo, public investors
Vale Logística Argentina(2)	Port operations	Argentina	100	100	–
Vale Logística Uruguay	Port operations	Uruguay	100	100	–
Central East African Railways ("CEAR")(3)	Railroad	Malawi	46.2	46.2	Mitsui, investors
Corredor de Desenvolvimento do Norte ("CDN")(3)	Railroad and maritime terminal operations	Mozambique	46.2	46.2	Mitsui, investors
Corredor Logístico Integrado de Nacala S.A. ("CLN")(4)	Railroad and port operations	Mozambique	50.0	50.0	Mitsui
Vale Logistics Limited ("VLL")(4)	Railroad operations	Malawi	50	50	Mitsui
Transbarge Navegación	Paraná and Paraguay Waterway System (Convoys)	Paraguay	100	100	–
VNC	Port and maritime terminal operations	New Caledonia	95.0	95.0	SPMSC
VMM	Port and maritime terminal operations	Malaysia	100	100	–
Vale Newfoundland & Labrador Limited	Port operations	Voisey's Bay and Long Harbour, in Newfoundland and Labrador	100	100	–
Vale Oman Distribution Center LLC	Port and maritime terminal operations	Oman	100	100	–

(1) BNDES holds debentures issued by Vale that are exchangeable into part of Vale's stake in VLI. Vale's equity interests in VLI may be reduced by up to 8% if BNDES exercises its rights under those debentures.

(2) Vale Logística Argentina is no longer operational.

- (3) Vale holds its interest in CEAR and CDN through a 50% interest in Nacala Corridor (DIFC) Limited and Nacala Corridor Holding, which collectively own 92.4% of these operating companies that comprise the NLC.
- (4) Vale holds its interest in CLN and VLL through a 50% interest in Nacala Corridor (DIFC) Limited and Nacala Corridor Holding, which collectively own 100% of these operating companies that comprise the NLC.

#### 4.1.1 Railroads

##### Brazil

*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 30-year renewable concession, which expires in 2027. 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 has rights to purchase railroad transportation capacity on our EFVM railroad. In 2017, the EFVM railroad transported a daily average of 335.1 thousand metric tons of iron ore and 60.8 thousand metric tons of other cargo. The EFVM railroad also carried one million passengers in 2017. In 2017, we had a fleet of 326 locomotives and 19,032 wagons at EFVM, which were operated by Vale 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 30-year renewable concession, which expires in 2027. 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 2017, the EFC railroad transported a daily average of 473.7 thousand metric tons of iron ore and 30.2 thousand metric tons of other cargo. EFC also carried 246 thousand passengers in 2017. EFC supports the largest train, in terms of capacity, in Latin America, which measures 3.5 kilometers, weighs 41.67 thousand gross metric tons when loaded and has 330 cars. In 2017, EFC had a fleet of 303 locomotives and 20,209 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 the weight of the freight in question, and are regulated by the Brazilian transportation regulatory agency, ANTT (*Agência Nacional de Transportes Terrestres*).

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 tons and three maritime terminals and ports operations. We hold a 37.6% stake in VLI, and are party to a shareholders' agreement with FI-FGTS, Mitsui and Brookfield, which hold the remaining equity interests in VLI. VLI's main assets are:

- *Ferrovía Centro-Atlântica ("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;
- *Ferrovía Norte-Sul railroad ("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.

In 2017, VLI transported a total of 38.184 billion ntk of general cargo, including 25.800 billion ntk from FCA and FNS and 12.384 billion ntk through operational agreements with Vale.

*MRS Logística S.A. ("MRS")*. The MRS railroad, in which we have a 48.2% 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 2017, it transported a daily average of 320.2 thousand metric tons of iron ore and 148.2 thousand metric tons of other cargo.

## Africa

We are concluding the ramp-up of the Nacala Logistic Corridor (NLC), which connects the Moatize mine to the Nacala-à-Velha maritime terminal, located in Nacala, Mozambique, and which crosses into the Republic of Malawi. The NLC consists of railway and port infrastructure, including greenfield and rehabilitation of existing railways in Mozambique and Malawi and a new coal port terminal in Mozambique. The NLC will allow for the expansion of the Moatize mine and support our operations in Southeastern Africa. In Mozambique, we are operating under two concession agreements, one related to the Mozambican greenfield railway and another related to the newly constructed coal port, both held by our subsidiary Corredor Logístico Integrado de Nacala S.A. ("CLN"), which will expire in 2042, subject to renewal. We have also rehabilitated existing railroads under a concession held by our subsidiary, CDN, which will expire in 2035. In Malawi, we are operating under a concession held by our subsidiary, VLL, which will expire in 2046, subject to renewal, and we have also rehabilitated existing railroads under a concession held by our subsidiary, CEAR, which was extended in 2013 for a 30-year period from the commencement of rail services under VLL's greenfield railway concession.

In March 2017, we concluded the transaction with Mitsui pursuant to which we transferred 50% of our stake in Nacala Logistic Corridor, which includes entities holding railroad and port concessions in Mozambique and Malawi. See *Overview—Business overview—Significant changes in our business—Partnership in coal assets in Mozambique*.



In November 2017, the NLC companies obtained project financing in the total amount of US\$2.730 billion. The transaction closed in March 2018. Vale received US\$2.6 billion in proceeds, in repayment of certain shareholders loans provided for construction of NLC, net of certain commissions paid by NLC. The project financing will be repaid in 14 years with the proceeds obtained from the tariff charged by NLC in connection with the provision of coal transportation and general cargo services.

#### 4.1.2 Ports and maritime terminals

##### Brazil

We operate a port 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 port 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 Praia Mole port is also located in the Brazilian state of Espírito Santo.

- 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. 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. Pier II can accommodate one vessel of up to 405,000 DWT at a time, limited at 23 meters draft. In Pier I there are two ship loaders, which can load up to 13,500 metric tons per hour each. In Pier II there are two ship loaders that work alternately and can each load up to 16,000 metric tons per hour continuously. In 2017, 102.2 million metric tons of iron ore and iron ore pellets were shipped through the terminal for us. The iron ore maritime terminal has a storage yard with a capacity of 3.1 million metric tons.
- The *Terminal de Produtos Diversos* handled 7.0 million metric tons of grains and fertilizers in 2017. VLI has the right to purchase the capacity of the *Terminal de Produtos Diversos*.
- The *Terminal de Granéis Líquidos* handled 526 thousand metric tons of fuel in 2017. VLI has the right to purchase the capacity of the *Terminal de Granéis Líquidos*.
- The Praia Mole terminal is principally a coal terminal and handled 13.2 million metric tons of coal and other related cargo in 2017. VLI has the right to purchase the capacity of the Praia Mole terminal.

*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 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 tons per hour. 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 tons per hour. In 2017, Vale received from ANTAQ, the federal agency in charge of maritime transportation services, the definitive authorization to operate Pier IV (north berth), including accreditation for international maritime traffic. Cargo shipped through our

Ponta da Madeira maritime terminal consists of the Northern system production of iron ore and manganese. In 2017, 169.5 million metric tons of iron ore were handled through the terminal. The Ponta da Madeira maritime terminal has a storage yard with a static capacity of 6.6 million tons, which will be expanded to 10.7 million tons. VLI currently handles and stores fertilizers, grain, pig iron and manganese ore, which are then shipped through the Itaquí Port.

*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). 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 2017, the terminal loaded 19.1 million metric tons of iron ore.

*Guaíba Island maritime terminal.* From this terminal we also 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 2017, the terminal loaded 43.5 million metric tons of iron ore.

VLI also operates Inácio Barbosa maritime terminal (TMIB), owned by Petrobras, in the Brazilian state of Sergipe; Santos maritime terminal (TIPLAM), in the Brazilian state of São Paulo, which is jointly owned by VLI and Vale Fertilizantes; and Pier II in the Itaquí Port, which can accommodate vessels of up to 155,000 DWT and has a maximum loading rate of 4,500 tons per hour for pig iron and of 3,000 tons per hour for grains.

### Argentina and Uruguay

Until October 2017, Vale Logística Argentina S.A. (“VLA”) contracted third party services to operate two terminals, located at Rosario port in the province of Santa Fé and at San Nicolas port in the province of Buenos Aires, and a transshipper located in the province of Santa Fé. We handled 960 thousand metric tons of iron and manganese ore through these ports and transshipper in 2017, which came from Corumbá, Brazil, via the Paraguay and Paraná rivers, for shipment to Brazilian, Asian and European markets.

To lower shipment costs and improve efficiency, we opted to transfer our Argentine port and maritime terminal operations to Uruguay in 2017. VLA terminated the contracts with third party services to operate the San Nicolas port and the Rosario port in June 2017 and in September 2017, respectively, and is no longer operational.

Since October 2017, 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 2017, we handled 740 thousand metric tons of iron and manganese ore through the Corporación Navios port in 2017.

### Canada

Vale Newfoundland and 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, copper 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.

### *Oman*

Vale Oman Distribution Center LLC operates a 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 tons per hour and the nominal unloading capacity is 9,000 tons per hour.

### *Indonesia*

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

- The Balantang Special Port is located in Balantang Village, South Sulawesi, and has two types of piers, with total capacity of 10,000 DWT, two barge slips for barges with capacity of up to 4,000 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 vessels with capacity of up to 20,000 DWT, and a terminal that can accommodate fuel tanker vessels with capacity of up to 5,000 DWT, totaling capacity of 25,000 DWT.

### *New Caledonia*

We own and operate a port in Prony Bay, Province Sud, New Caledonia. This port has three terminals, including a passenger ferry terminal able to berth two ships up to 50m long, a dry bulk wharf where vessels of up to 55,000 DWT can unload at a rate of 8,000 tons per day and a general cargo wharf where vessels up to 200m long can berth. The general cargo wharf can move containers at a rate of seven per hour and liquid fuels (LPG, HFO, diesel) at a rate of 350 cubic meters per hour, and break-bulk. The port's container yard, covering an area of approximately 13,000 square meters, can receive up to 1,000 units. A bulk storage yard is linked to the port by a conveyor and has a storage capacity of 94,000 tons of limestone, 95,000 tons of sulfur, and 60,000 tons of coal.

### *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 2017, the terminal unloaded 22 million metric tons of iron ore and loaded 22 million metric tons of iron ore.

## *4.1.3 Shipping*

### *Maritime shipping of iron ore and pellets*

In 2017, we shipped approximately 211 million metric tons of iron ore and pellets pursuant to transactions in which we were responsible for freight (CFR or CIF basis), which corresponds to 61% of our total iron ore and pellets sales. We transport 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. These vessels reduce energy

consumption and greenhouse emissions by carrying an increased amount of cargo in a single trip, offering lower shipping costs. In 2017, approximately 48 million tons of iron ore products were transported by these vessels under long term contracts of affreightment with owners of very large ore carriers of 400,000 DWT.

We also own four capesize vessels with capacities ranging from 150,000 to 200,000 DWT.

We have changed our strategy with respect to maritime shipping. In the past, we owned and operated a low-cost fleet of vessels to transport our cargoes from Brazil to our markets, especially in Asia. We now focus on securing long-term shipping capacity and protecting against volatility in freight pricing through long-term contracts of affreightment, without incurring the costs relating to building and owning the vessels. Since 2014, we have sold 19 of our very large ore carriers of 400,000 DWT for an aggregate amount of US\$1.940 billion. We sold the four remaining of these very large ore carriers in 2017.

### *Paraná—Paraguay waterway system*

Through our subsidiary, Transbarga 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 or in a contracted terminal in Uruguay, where we load the ore into ocean-going vessels. We transported 2.5 million tons through the waterway system in 2017, including 800 thousand tons of ore through our local customers' terminals, 960 thousand tons of ore through two ports in Argentina and 740 thousand tons of ore through a port in Uruguay.

### *Tugboats*

We manage a fleet of 16 owned tugboats. We directly operate nine tugboats in the ports of Vitória and Mangaratiba, in the Brazilian states of Espírito Santo and Rio de Janeiro, respectively. We have a 50% stake in a consortium that operates five tugboats in the port of São Luís in the Brazilian states of Maranhão. One additional tugboat is freighted to and operated by third parties, under their responsibility, in other ports in Brazil. We also own two tugboats in New Caledonia.

## **4.2 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 and minimizing the risk of energy shortages.

### *Brazil*

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 2017, our installed capacity in Brazil was 1.4 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 own direct stakes in three hydroelectric power plants and four small hydroelectric power plants in operation. The hydroelectric power plant of Candonga, the operations of which remain suspended since November 2015 as a result of the failure of the Samarco Dam, is located in the Southeastern region, Machadinho is located in the Southern region, and Estreito is located in the Northern region. The small hydroelectric power plants of Ituerê, Mello, Glória and Nova Maurício are located in the Southeastern 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 Ceará State, 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”), the company established to develop and operate the Belo Monte hydroelectric plant in the Brazilian state of Pará, which started operations in April 2016. 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 entered into with Norte Energia.

We also produce, through our subsidiary Biopalma da Amazônia S.A. (“Biopalma”), palm oil in the Brazilian state of Pará, with the objective to produce biodiesel in the future through an industrial plant to be installed by Biopalma. This biodiesel, blended with regular diesel to produce diesel B20 (20% biodiesel), may be used to power our fleet of mining trucks, heavy machinery and locomotives in the Northern System operations.

### Canada

In 2017, our wholly owned and operated hydroelectric power plants in Sudbury generated 21% 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 2017, average demand for electrical energy was 173 MW to all surface plants and mines in the Sudbury area.

In 2017, 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 CO<sub>2</sub> emissions by replacing non-renewable power generation, and enable us to increase our current nickel production capacity in Indonesia.

## 5. Other investments

Below is a list of our main investments:

- *Pelletizing plants.* We have a 25% stake in two iron ore pelletizing plants in China, Zhuhai YPM and Anyang. The remaining stake in Zhuhai YPM is owned by Zhuhai Yueyufeng Iron and Steel Co. Ltd. and Halswell Enterprises Limited, and the remaining stake in Anyang is owned by Anyang Iron & Steel Co., Ltd.

- *Coal operations.* We have a 25% stake in Longyu (in the Henan province) coal operations in China. Longyu produces metallurgical and thermal coal and other related products, and the remaining interests are owned by Yongmei Group Co., Ltd. (former Yongcheng Coal & Electricity (Group) Co. Ltd.), Shanghai Baosteel International Economic & Trading Co., Ltd. and other minority shareholders.
- *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., Pohang Technology College and a number of individual investors. Korea Nickel Corporation produces finished nickel for the stainless steel industry using intermediate products from our Matsuzaka and New Caledonia operations.
- *Steel producers.* We own a 50% stake in California Steel Industries, Inc. ("CSI"), a producer of flat-rolled steel and pipe products located in California, United States. The remainder is owned by JFE Steel. CSI's annual production capacity is approximately 2.8 million metric tons of flat and pipe products. We also 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.
- *Bauxite.* We own a 40% stake in Mineração Rio do Norte S.A. ("MRN"), a bauxite mining business located in Brazil.

# RESERVES

## PRESENTATION OF INFORMATION CONCERNING RESERVES

The estimates of proven and probable ore 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 the SEC's Industry Guide 7:

- Reserves are the part of a mineral deposit that could be economically and legally extracted or produced at the time of the reserve determination.
- Proven (measured) reserves are reserves for which (a) quantity is computed from dimensions revealed in outcrops, trenches, workings or drill holes; grade and/or quality are computed from the results of detailed sampling; and (b) the sites for inspection, sampling and measurement are spaced so closely and the geologic character is so well defined that size, shape, depth and mineral content of reserves are well-established.
- Probable (indicated) reserves are reserves for which quantity and grade and/or quality are computed from information similar to that used for proven (measured) reserves, but the sites for inspection, sampling and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for proven (measured) reserves, is high enough to assume continuity between points of observation.

We periodically revise our reserve estimates when we have new geological data, economic assumptions or mining plans. During 2017, we performed an analysis of our reserve estimates for certain projects and operations, which is reflected in new estimates as of December 31, 2017. Reserve estimates for each operation assume that we either have or expect to obtain all of 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 not been adjusted to reflect our proportional ownership interest. Certain figures in the tables, discussions and notes have been rounded. For a description of risks relating to reserves and reserve estimates, see *Risk factors*.

Our reserve estimates are based on certain assumptions about future prices. We have determined that our reported reserves could be economically produced if prices for the products identified in the following

table were equal to the three-year average historical prices through December 31, 2017. For this purpose, we used the three-year historical average prices set forth in the following table.

Commodity	Three-year average historical price	Pricing source
<i>Iron ore:</i>		
Vale(1) .....	US\$61.7 per dry metric ton	Average Platts IODEX (62% Fe CFR China)
<i>Coal:(2)</i>		
Metallurgical – Moatize .....	US\$139.6 per metric ton	Platts PHCC FOB
Thermal – Moatize .....	US\$68.87 per metric ton	Richards Bay FOB – RB1
<i>Base metals:</i>		
Nickel(3) .....	US\$10,619 per ton	LME Ni
Copper .....	US\$5,512 per ton	LME Cu
<i>Nickel and copper byproducts:</i>		
Platinum .....	US\$997 per oz	Average realized price
Palladium .....	US\$725 per oz	Average realized price
Gold .....	US\$1,222 per oz	Average realized price
Cobalt(3) .....	US\$36,737 per ton	99.3% low cobalt metal (source: Metal Bulletin)
<i>Manganese ore(4):</i>		
Manganese .....	US\$4.5 per dry metric ton unit	Average CRU (44% Mn CFR China basis)

(1) The economic assessment of our iron ore reserves is based on the average of 62% Fe iron ore prices, as adjusted to reflect the effects of freight, moisture and the quality premium for our iron ore.

(2) As received basis (8% moisture).

(3) Premiums (or discounts) are applied to the nickel and cobalt spot prices at certain operations to derive realized prices. These premiums (or discounts) are based on product form, long-term contracts, packaging and market conditions.

(4) The economic assessment of our manganese ore reserves is based on the average CRU prices, adjusted to reflect the effects of freight, moisture and the quality premium for our manganese ore prices on a CFR China basis.

## IRON ORE RESERVES

The following tables set forth our iron ore reserves and other information about our iron ore mines. Our reserve table reflects our production and operational plans, which are based on the facilities (consisting of both mines and processing plants) within each system, rather than the individual mines.

Because our strategic guidelines remain unchanged from 2016, variations in iron ore reserves from 2016 to 2017 predominantly reflect depletion through mine production.

We periodically review the economic viability of our iron ore reserves in light of changes in the iron ore industry. Although in the production stage, the Urucum and Corumbá mines' reserves are not



economically viable based on expected long-term prices. Since 2015 we are not reporting reserves at those facilities.

	Iron ore reserves(1)							
	Proven – 2017		Probable – 2017		Total – 2017		Total – 2016	
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade
<b>Southeastern System(2)</b>								
Itabira(3) .....	738.6	45.5	181.6	45.7	920.2	45.6	1,010.3	45.2
Minas Centrais(4) .....	149.9	48.5	626.7	56.6	776.5	55.1	849.4	55.0
Mariana(5) .....	496.4	45.3	3,604.0	44.2	4,100.4	44.3	4,138.8	44.3
<b>Total Southeastern System .....</b>	<b>1,384.8</b>	<b>45.8</b>	<b>4,412.3</b>	<b>46.0</b>	<b>5,797.1</b>	<b>45.9</b>	<b>5,998.5</b>	<b>46.0</b>
<b>Southern System(6)</b>								
Minas Itabirito(7) .....	454.0	55.0	3,204.2	43.5	3,658.2	45.0	3,746.8	45.1
Vargem Grande(8) .....	104.0	48.8	1,358.5	48.3	1,462.5	48.3	1,543.0	48.2
Paraopeba(9) .....	108.5	62.1	200.0	59.4	308.5	60.4	330.7	61.0
<b>Total Southern System .....</b>	<b>666.6</b>	<b>55.2</b>	<b>4,762.7</b>	<b>45.6</b>	<b>5,429.2</b>	<b>46.7</b>	<b>5,620.6</b>	<b>46.9</b>
<b>Northern System(10)</b>								
Serra Norte(11) .....	557.4	66.6	1,611.8	65.8	2,169.2	66.0	2,337.4	66.0
Serra Sul(12) .....	1,233.3	65.6	2,962.0	65.4	4,195.3	65.5	4,224.6	65.6
Serra Leste .....	5.0	66.2	253.2	65.4	258.1	65.4	260.4	65.4
<b>Total Northern System .....</b>	<b>1,795.6</b>	<b>65.9</b>	<b>4,827.0</b>	<b>65.5</b>	<b>6,622.6</b>	<b>65.6</b>	<b>6,822.5</b>	<b>65.7</b>
<b>Total Vale Systems .....</b>	<b>3,847.0</b>	<b>56.8</b>	<b>14,001.9</b>	<b>52.6</b>	<b>17,848.9</b>	<b>53.5</b>	<b>18,441.5</b>	<b>53.6</b>

- (1) Tonnage is stated in millions of metric tons of wet run-of-mine, based on the following moisture contents: Itabira (1.7%); Minas Centrais (5.9%); Mariana (3.9%); Minas Itabirito (4.3%); Vargem Grande (3.9%); Paraopeba (5.2%); Serra Norte (6.4%); Serra Sul (4.6%); Serra Leste (3.6%).
- (2) Approximate drill hole spacing used to classify the Southeastern System's reserves was: 100m x 100m for proven reserves and 200m x 200m for probable reserves. Average product recovery (tonnage basis) of the iron ore reserves is: 53% for Itabira, 78% for Minas Centrais and 62% for Mariana.
- (3) Itabira integrated operation includes Conceição and Minas do Meio mines.
- (4) Minas Centrais' integrated operations is represented by Brucutu mine operation and by Apolo deposit, not currently in production. Água Limpa is no longer operating and therefore is not included in the disclosure anymore.
- (5) Mariana's integrated operations include the Alegria, Fábrica Nova and Fazendão mines and the Capanema and Conta História projects.
- (6) Approximate drill hole spacing used to classify the Southern System's reserves was: 100m x 100m for proven reserves and 200m x 200m for probable reserves. Average product recovery (tonnage basis) of the iron ore reserves is: 65% for Minas Itabirito, 58% for Vargem Grande and 100% for Paraopeba.
- (7) Minas Itabirito's integrated operations include the Sapecado, Galinheiro, João Pereira and Segredo mines.
- (8) Vargem Grande's integrated operations include the Tamanduá, Capitão do Mato and Abóboras mines.
- (9) Paraopeba's integrated operations include the Jangada, Córrego do Feijão, Mar Azul and Capão Xavier mines. Additionally, they include Capim Branco deposit, not currently in operation.
- (10) Approximate drill hole spacing used to classify the Northern System's reserves was: 150m x 100m for proven reserves and 300m x 200m for probable reserves, except Serra Leste which is 100m x 100m for proven reserves and 200m x 200m for probable reserves. Average product recovery (tonnage basis) of the iron ore reserves is: 100% for Serra Norte, 100% for Serra Leste and 100% for Serra Sul.
- (11) Serra Norte's integrated operations include the N4W, N4E and N5 mines. Additionally, they include N1, N2 and N3 deposits, not currently in operation.
- (12) Serra Sul's integrated operations include the S11C and S11D deposits.

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

	Iron ore integrated operations			
	Type	Operating since	Projected exhaustion date(1)	Vale interest (%)
<b>Southeastern System</b>				
Itabira .....	Open pit	1957	2028	100.0
Minas Centrais .....	Open pit	1994	2056	100.0
Mariana .....	Open pit	1976	2105	100.0
<b>Southern System</b>				
Minas Itabirito .....	Open pit	1942	2118	100.0
Vargem Grande .....	Open pit	1993	2054	100.0
Paraopeba .....	Open pit	2001	2034	100.0
<b>Northern System</b>				
Serra Norte .....	Open pit	1984	2040	100.0
Serra Sul .....	Open pit	2016	2046	100.0
Serra Leste .....	Open pit	2014	2060	100.0

(1) Indicates the life-of-mine for the operating mine with the longest projected exhaustion date in the complex.

## MANGANESE ORE RESERVES

The following tables set forth manganese ore reserves and other information about our mines. The variation in the Azul mine's ore reserves from 2016 to 2017 mainly reflects a resource model update and new economic assumptions for mineral reserves, as well as a 4.5 Mt reduction in tailings dam mineral reserves due to new technical and economic assumptions.

Our reserves information for Urucum and Morro da Mina are currently being reviewed to consider new geological information and new reserve assumptions. As this revision is ongoing, we disclose current reserves for these mines by depletion.

	Manganese ore reserves(1)(2)							
	Proven – 2017		Probable – 2017		Total – 2017		Total – 2016	
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade
Azul .....	11.0	26.4	4.0	27.2	15.0	26.6	38.0	28.4
Urucum .....	7.9	46.4	1.3	47.0	9.3	46.5	10.1	46.3
Morro da Mina .....	5.8	30.7	2.7	29.7	8.5	30.4	8.6	30.6
Total .....	<b>24.8</b>	<b>33.8</b>	<b>8.0</b>	<b>31.3</b>	<b>32.7</b>	<b>33.2</b>	<b>56.6</b>	<b>31.9</b>

(1) Ore reserves as of December 31<sup>st</sup>, 2017 are reported as wet million metric tons and dry manganese grade, based on the following moisture contents: Azul (18.0%); Urucum (4.2%) and Morro da Mina (3.4%).

(2) Approximate drill hole spacing used to classify the reserves was: 100m x 100m for proven reserves and 200m x 200m for probable reserves. Average product recovery (tonnage basis) of the manganese reserves are: Azul (40%); Urucum (82%) and Morro da Mina (70%).

The mine exhaustion schedule has been adjusted to reflect our new production plan.

Manganese ore mines				
	Type	Operating since	Projected exhaustion date	Vale interest (%)
Azul.....	Open pit	1985	2024	100.0
Urucum .....	Underground	1976	2027	100.0
Morro da Mina .....	Open pit	1902	2050	100.0

## COAL RESERVES

Our coal reserve estimates have been provided on an in-place material basis after adjustments for depletion through mine production, anticipated mining losses and dilution. Marketable reserves include adjustments for losses associated with beneficiation of raw coal mined to meet saleable product requirements.

The decrease in the Moatize's coal reserves reported in 2017, compared to 2016, reflects the results of an internal review of Moatize's reserves. Over the past 18 months, we have undertaken an extensive exploration program to better understand the characteristics of the Moatize coal deposit. New geological information and our experience from coal operations in Moatize resulted in revisions to resource and reserve estimates, and subsequently realignments in our exploration program.

We continue our exploration program in Moatize, targeting areas within the current mine plan and the extension of it, aiming to aggregate more reserves in the future.

Coal ore reserves(1)									
ROM(2)									
Coal type	Proven – Probable –		Total – 2017		Total – 2016		Marketable reserves(3)		
	2017	2017	Tonnage	CV	Tonnage	CV	2017	2016	
	Tonnage		Tonnage	CV	Tonnage	CV	Tonnage	Tonnage	
Moatize .....	Metallurgical & thermal	206.7	815.8	1,022.5	26.0 (thermal)	1,395.6	28.3 (thermal)	415.0	499.6

- (1) The reserves stated above by deposit are on a 100% shareholding basis. Vale's ownership interest in accordance with the table below should be used to calculate the portion of reserves directly attributable to Vale.
- (2) Tonnage is stated in millions of metric tons and is now reported on an *in situ* 4.0% moisture basis. Calorific Value (CV) for thermal coal is stated as the Gross Calorific Value (Mj/Kg) on air-dried basis.
- (3) Tonnage is stated in millions of metric tons.

Coal mines				
	Type	Operating since	Projected exhaustion date	Vale interest (%)
Moatize(1).....	Open pit	2011	2039(2)	80.75

- (1) Vale's stake in Moatize decreased after completion of the transaction with Mitsui.
- (2) The mine exhaustion date was adjusted to reflect the current declared coal reserves.

## NICKEL ORE RESERVES

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

	Nickel ore reserves(1)								
	Proven – 2017		Probable – 2017		Total – 2017		Total – 2016		Recovery range (%)
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
<i>Canada</i>									
Sudbury .....	23.7	1.67	41.2	1.29	64.9	1.43	71.9	1.40	75 – 85
Thompson ..	–	–	–	–	–	–	–	–	85 – 90
Voisey's Bay	17.0	2.23	15.4	2.02	32.4	2.13	33.8	2.20	80 – 90
<i>Indonesia</i>									
PTVI.....	82.7	1.80	12.4	1.73	95.1	1.79	110.9	1.78	85 – 90
<i>New Caledonia</i>									
VNC.....	–	–	–	–	–	–	–	–	–
<i>Brazil</i>									
Onça Puma .	61.3	1.64	45.1	1.38	106.5	1.53	108.0	1.53	85 – 90
<b>Total .....</b>	<b>184.8</b>	<b>1.77</b>	<b>114.1</b>	<b>1.47</b>	<b>298.9</b>	<b>1.66</b>	<b>324.5</b>	<b>1.66</b>	

(1) Tonnage is stated in millions of dry metric tons. Grade is % of nickel.

In Canada, our Sudbury operation's mineral reserves decreased in 2017 due to depletion, and the reclassification of mineral reserves at the Stobie mine to resources or to exploration targets, as a result of the Stobie mine being put into care and maintenance. The Voisey's Bay operations mineral reserves decreased due to depletion. The mineral reserves at the PTVI operations decreased due to depletion, pit redesigns, re-evaluations, and a reclassification of mineral reserves to mineral resources. The mineral reserves at Onça Puma decreased due to depletion .

We are not reporting the mineral reserves of VNC and Thompson as of December 31, 2017, because the mineral reserves for our operations in New Caledonia and Thompson would not be economically viable at the three-year historical average price, due to the decline in nickel prices in the past three years. However, based on our expectations about future prices, our operations in New Caledonia and Thompson continue to be economically viable. VNC and Thompson continue to operate and are currently conducting studies to identify measures to reduce their costs of production.

	Nickel ore mines			
	Type	Operating since	Projected exhaustion date	Vale interest (%)
<i>Canada</i>				
Sudbury .....	Underground	1885	2043	100.0
Thompson .....	Underground	1961	–	100.0
Voisey's Bay(1) .....	Open pit/ Underground	2005	2033	100.0
<i>Indonesia</i>				
PTVI .....	Open pit	1977	2035	58.7
<i>New Caledonia</i>				
VNC .....	Open pit	2011	–	95.0
<i>Brazil</i>				
Onça Puma .....	Open pit	2011	2064	100.0

(1) Voisey's Bay will transition from an open pit mine to an underground mine.

## COPPER ORE RESERVES

Our copper mineral reserve estimates are of in-place material after adjustments for depletion and mining losses and recoveries, with no adjustments made for metal losses due to processing.

	Copper ore reserves(1)								
	Proven – 2017		Probable – 2017		Total – 2017		Total – 2016		Recovery range (%)
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
<i>Canada</i>									
Sudbury .....	23.7	2.35	41.2	1.49	64.9	1.80	71.9	1.71	90 – 95
Voisey's Bay .....	17.0	1.03	15.4	0.89	32.4	0.96	33.8	1.02	90 – 95
<i>Brazil</i>									
Sossego .....	110.7	0.68	9.4	0.66	120.1	0.68	110.9	0.65	90 – 95
Salobo .....	644.1	0.64	549.3	0.57	1,193.4	0.61	1,178.3	0.63	80 – 90
<i>Zambia</i>									
Lubambe(2) .....							45.4	2.18	85 – 90
<b>Total .....</b>	<b>795.6</b>	<b>0.70</b>	<b>615.2</b>	<b>0.64</b>	<b>1,410.8</b>	<b>0.68</b>	<b>1,440.3</b>	<b>0.75</b>	

(1) Tonnage is stated in millions of dry metric tons. Grade is % of copper.

(2) Vale sold its stake in the Lubambe mine in December 2017.

In Canada, our Sudbury operation's mineral reserves decreased in 2017 due to depletion, reclassification of mineral reserves at the Stobie mine to mineral resources or exploration targets as a result of the Stobie mine being put into care and maintenance. The Voisey's Bay operations mineral reserves decreased due to mining depletion. In Brazil, the Sossego operations mineral reserves increased due to stockpile additions and the addition of new mineral reserves at the bottom of the Sequeirinho and Sossego pits, the result of a review of the mineral resource block model and re-design on the final pit configuration, offset by depletion. The mineral reserve estimates at the Salobo operation increased due to depletion and re-evaluation offset by the addition of new mineral reserves upgraded from mineral resource and stockpile additions.

	Copper ore mines			
	Type	Operating since	Projected exhaustion date	Vale interest (%)
<i>Canada</i>				
Sudbury .....	Underground	1885	2043	100.0
Voisey's Bay .....	Open pit/Underground	2005	2033	100.0
<i>Brazil</i>				
Sossego .....	Open pit	2004	2027	100.0
Salobo .....	Open pit	2012	2067	100.0
<i>Zambia</i>				
Lubambe(1) .....	Underground	2013	2038	0.0

(1) Vale sold its stake in the Lubambe mine in December 2017.

## PGMS AND OTHER PRECIOUS METALS RESERVES

We expect to recover significant quantities of precious metals as byproducts of our Sudbury, Sossego and Salobo operations. Our mineral reserve estimates are of in-place material after adjustments for depletion and mining losses and recoveries, with no adjustments made for metal losses due to processing.

	Precious metals reserves(1)								
	Proven – 2017		Probable – 2017		Total – 2017		Total – 2016		Recovery range (%)
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
<i>Canada</i>									
<i>Sudbury</i>									
Platinum.....	23.7	1.3	41.2	1.2	64.9	1.2	71.9	1.2	80 – 90
Palladium....	23.7	1.5	41.2	1.4	64.9	1.4	71.9	1.3	80 – 90
Gold .....	23.7	0.5	41.2	0.5	64.9	0.5	71.9	0.4	80 – 90
<i>Brazil</i>									
<i>Sossego</i>									
Gold .....	110.7	0.2	9.4	0.2	120.1	0.2	110.9	0.2	75 – 80
<i>Salobo</i>									
Gold .....	644.1	0.4	549.3	0.3	1,193.4	0.3	1,178.3	0.4	60 – 70
Total Pt + Pd(2) ..	23.7	2.8	41.2	2.6	64.9	2.6	71.9	2.5	
Total Gold.....	778.6	0.3	599.8	0.3	1,378.4	0.3	1,361.1	0.3	

(1) Tonnage is stated in millions of dry metric tons. Grade is grams per dry metric ton.

(2) Pt+Pd is the sum of Platinum and Palladium grades.

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

	Precious metals mines			
	Type	Operating since	Projected exhaustion date	Vale interest (%)
<i>Canada</i>				
Sudbury .....	Underground	1885	2043	100.0
<i>Brazil</i>				
Sossego.....	Open pit	2004	2027	100.0
Salobo.....	Open pit	2012	2067	100.0

## COBALT ORE RESERVES

We expect to recover significant quantities of cobalt as a byproduct of our Sudbury and Voisey's Bay operations. Our cobalt reserve estimates are of in-place material after adjustments for depletion and mining losses, with no adjustments for metal losses due to processing.

	Cobalt ore reserves(1)								
	Proven – 2017		Probable – 2017		Total – 2017		Total – 2016		Recovery range (%)
	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
Canada									
Sudbury .....	23.7	0.05	41.2	0.04	64.9	0.04	71.9	0.04	20 – 40
Voisey's Bay .....	17.0	0.13	15.4	0.13	32.4	0.13	33.8	0.13	70 – 80
New Caledonia									
VNC .....	–	–	–	–	–	–	–	–	–
Total .....	40.7	0.08	56.6	0.06	97.3	0.07	105.7	0.07	

(1) Tonnage is stated in millions of metric tons. Grade is % of cobalt.

Our cobalt reserve estimates decreased in 2017 for the same reasons discussed above in connection with the nickel mineral reserves.

	Cobalt ore mines			
	Type	Operating since	Projected exhaustion date	Vale interest (%)
Canada				
Sudbury .....	Underground	1885	2043	100.0
Voisey's Bay .....	Open pit/ Underground	2005	2033	100.0
New Caledonia VNC .....	Open pit	2011	–	95.0

## CAPITAL EXPENDITURES

We have an extensive program of investments in the organic growth of our businesses. The figures discussed in this section are for project execution and sustaining existing operations and replacement projects.

The 2018 investment budget approved by our Board of Directors is US\$972 million for project execution, reflecting a 39.9% decrease compared to the 2017 investment budget, and US\$2.865 billion for sustaining existing operations and replacement projects, reflecting a 28.4% increase compared to 2017. Most of the capital expenditures budget for project execution will be invested in Brazil (96.9%).

	2016 expenditures(1)	2017 expenditures(1)	2018 budget	
	(US\$ million)	(US\$ million)	(US\$ million)	(% of total)
Project execution (construction in progress) .....	3,179	1,617	972	25.3%
Investments to sustain existing operations and replacement projects (property, plant and equipment) .....	2,302	2,231	2,865	74.7%
Total .....	US\$ 5,482	US\$ 3,848	US\$ 3,837	100%

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

We are developing a focused organic growth portfolio with fewer projects, but higher expected rates of return. Our main initiative, the S11D project, accounts for 81.6% of the US\$972 million budgeted for project execution in 2018.

The following table sets forth total expenditures in 2017 for our main investment projects and expenditures budgeted for those projects in 2018, together with estimated total expenditures for each project and the actual or estimated start-up date of each project as of December 31, 2017.

Business area	Main projects(1)	Actual or estimated start-up	Executed CAPEX		Expected CAPEX	
			2017(2)	Total executed(3)	2018(4)	Total expected(5)
Iron ore .....	CLN S11D(6)	1H14 to 2H19	914	(US\$ million) 6,576	647	7,850

(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, 2017, including capital expenditures in prior periods.

(4) Figure presented corresponds to the amount approved in the US\$3.837 billion investment budget.

(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.

(6) Original expected CAPEX for CLN S11D was US\$11.582 billion.

The largest ongoing capital expenditure project is the increase in the logistics capacity of the Northern System to support the S11D project, including the expansion of approximately 570 km of railway (505 km of which we have already built), construction of a railway spur of 101 km, acquisition of wagons and locomotives and port expansion (onshore and offshore expansions at Ponta da Madeira maritime terminal). This project is expected to increase EFC's nominal logistics capacity to approximately 230 Mtpy. The duplication of the railway achieved 80% of physical progress and the railway spur was totally completed. The port offshore started up in the last quarter of 2016. The project is 88% complete, with executed capital expenditures (total cash outflows) of US\$6.576 billion. The start-up is expected to continue through the second half of 2019.

The mine expansion project at Voisey's Bay, which encompasses the construction of an underground mine to compensate for gradual depletion of our open pit mine, is currently being reassessed. As a result, the Voisey's Bay production plan was reduced in order to extend the life of the mine while the project is being reassessed.



## 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 State 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 principal concessions and other similar rights for our continuing operations. It does not include information with respect to our fertilizer business (discontinued operations).

Location	Mining title	Approximate area covered (in hectares)	Expiration date
Brazil.....	Mining concessions (including under applications)	597,249	Indefinite
Canada(1).....	Mining concessions (terminology varies among provinces)	219,139	2017 – 2036
Indonesia(2).....	Contract of work	118,017	2025
Australia.....	Mining leases	4,559	2041
New Caledonia(3).....	Mining concessions	21,077	2022 – 2051
Mozambique(4).....	Mining concessions	23,780	2032

(1) The expiration date of our leases in Sudbury is subject to current renewal applications. The approval process for these applications, submitted in 2016 and 2017, is in progress. All conditions required for the renewal of these leases were fulfilled. This process usually takes a number of years and we may continue to operate while the approval process is ongoing.

(2) Entitled to two 10-year extensions, subject to approval of the Indonesian government.

(3) VNC has requested renewal of some concessions that were scheduled to expire before 2018. We may continue to operate while the approval process is ongoing.

(4) Entitled to 25-year extensions, subject to approval by the Mozambique government.

In addition to the concessions listed above, we have exploration licenses and exploration applications covering 3.8 million hectares in Brazil and 1.3 million hectares in other countries.

There are several proposed or recently adopted changes in mining legislation and regulations in the jurisdictions where we have operations that could materially affect us.

- *Brazil.* In 2017, new legislative and regulatory frameworks for the mining industry were enacted, providing for changes in the rates and basis for calculation of the royalties (CFEM—*Compensação Financeira pela Exploração de Recursos Minerais*) applicable to various mining products, the creation of a new governmental agency, the National Mining Agency (“ANM”), to regulate the mining industry, collect royalties and impose sanctions for nonpayment.
- *New Caledonia.* In 2014, the local authorities of New Caledonia created a protected wetland area, which covers 27% of the surface area of the total VNC tenements and could affect

potential mining activities. These restrictions are not expected to impact on our disclosed reserves.

## 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 the CFEM (*Compensação Financeira pela Exploração de Recursos Minerais*) on the revenues from the sale of minerals we extract, net of taxes, insurance costs and costs of transportation. A statute approved in 2017 changed the basis for calculation of the CFEM, as follows: (i) for domestic sales, the basis for calculation of CFEM is the revenue from sales, net of sales taxes and contributions; (ii) for exports, the basis for calculation of CFEM is 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 ANM. As of November 2017, new CFEM rates are: 3.5% for iron ore; 2% for copper, nickel, fertilizers and other materials; 3% for bauxite, potash and manganese ore; and 1.5% for gold.
- *Brazilian states.* Several Brazilian states impose a tax on mineral production (*Taxa de Fiscalização de Recursos Minerais—TFRM*), which is assessed at rates ranging from R\$0.50 to R\$3.364 per metric ton of minerals produced in or transferred from the state.
- *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.
- *Mozambique.* Pursuant to a mining agreement signed in June 2007 with the Government of the Republic of Mozambique requires that we pay a royalty known as the IPM (*Imposto sobre a Produção Mineira*) on revenues from sales of extracted coal, net of insurance and transportation costs incurred before sales. The tax rate on coal mining activity in Mozambique is currently 3%.
- *Indonesia.* Our subsidiary 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 operate. In most jurisdictions, the development of new facilities requires us to submit environmental and social impacts statements 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.

We are taking several steps to improve the efficiency of the licensing process, including stronger integration of our environmental and project development teams, funding research into new and alternative technologies to reduce environmental and social impacts, use and continuous improvement of a Best Practices Guide for Environmental Licensing and the Environment, the deployment of highly-skilled specialist teams, closer interaction with environmental regulators and the creation of an executive committee to expedite internal decisions regarding licensing.

Environmental regulations affecting our operations relate, among other matters, to emissions into the air, soil and water; 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 needed since the mining license; climate change and decommissioning and reclamation. Environmental legislation is becoming stricter worldwide, which could lead to greater costs for environmental compliance. In particular, we expect heightened attention from various governments to reducing greenhouse gas emissions as a result of concern over climate change, especially following the entry into force of the Paris Agreement in late 2016.

There are several examples of environmental regulation and compliance initiatives that could affect our operations. For instance, under applicable Brazilian regulations for the protection of caves, we are required to conduct extensive technical studies and negotiate compensatory measures with Brazilian environmental regulators in order to continue to operate in certain sites. In certain of our iron ore mining operations or projects, we may be required to limit or modify our mining plans or to incur additional costs to preserve caves or to compensate for the impact on them, with potential consequences for production volumes, costs or reserves in our iron ore business. Also, a Brazilian regulation for the protection of indigenous people, which was enacted in 2011 and revised in 2015, requires us to conduct specific studies of impact and sponsor mitigation programs in connection with operations and projects close to indigenous people's lands. Also, in 2017, the federal government created new rules for the payment of environmental compensation for activities subjected to environmental assessment.

## REGULATION OF OTHER ACTIVITIES

In addition to mining and environmental regulation, 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 and safety, 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 contracts granted by the federal government, and our railroad concessions are subject to regulation and supervision by the Brazilian Ministry of Transportation, Ports and Civil Aviation and the regulatory agency for ground transportation (ANTT). The concessions for EFC and EFVM expire in 2027 and may be renewed at the federal government's discretion. 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, and FCA and MRS concessions expire in 2026. Rail transportation prices can be negotiated directly with the users of such services, subject to tariff ceilings approved by ANTT for each of the concessionaires and each of 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. In 2016, we and other railroad concessionaries in Brazil initiated discussions with ANTT regarding the possibility of early renewal of railways concession contracts. If we agree to an earlier renewal of our concession, we may have to agree with additional performance indications, new investments obligations and service standards.

- *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 Transport, Ports and Civil Aviation through the Secretary of Ports (SNP), whose purpose is to formulate policies and guidelines. In 2014, we renewed the agreements pursuant to which the SNP grants us rights to operate our private terminals, with the exception of the agreement with CPBS, which will expire in 2026. These renewed agreements will be effective until 2039.
- *Brazilian regulation of mining dams.* In May 2017, the DNPM (predecessor to the ANM) created new obligations for companies operating mining dams in Brazil, primarily:
  - *Audit:* Companies operating mining dams must conduct two annual stability audits for each dam and prepare a stability condition report. Specifically in the State of Minas Gerais, these audits and reports must be prepared by external auditors.
  - *Periodic Safety Reviews:* The stability condition report must include detailed analysis of all dam's documentation impacts on surrounding communities, including hazards and failure impact studies. Companies operating mining dams classified as high associated potential damage (DPA) must complete these studies by June 2018, while those for medium-DPA mining dams must be completed by December 2018 and those for low-DPA mining dams must be completed by June 2019.
  - *Emergency Action Plan Training:* Companies operating high-DPA mining dams must conduct two annual emergency action plan training sessions for their employees.
  - *Monitoring:* Video monitor must be implemented for all high-DPA mining dams by June 2019.
- *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 REACH regulations. In addition, South Korea is 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 are based not only on the international shipping categories, but also on the types of cargoes transported, including special rules for iron ore, coal, nickel and copper. The IMO is currently discussing further measures for enhancing the energy efficiency of international shipping including the development of a global data collection system which will eventually enable

market-based measures to curb greenhouse gas emissions. These measures to curb greenhouse gas emissions may increase our freight cost in the future. In 2016, the IMO also approved regulation establishing limits for sulfur oxides emission limits, which will become 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 to limit air emissions. Also, the International Convention for the Control and Management of Ships' Ballast Water and Sediments became effective in September 2017 for new ships (those with keels laid after that date). For existing ships, the convention will become effective in stages beginning in September 2019, following which date each vessel will have a specific deadline for compliance, with the global fleet required to be fully compliant by September 2024. Under this convention, all compliant ships during their international voyages are required to manage their ballast water and sediments in accordance with the defined requirements, which may also result in increases of freight and port operation costs.

## III. OPERATING AND FINANCIAL REVIEW AND PROSPECTS

### OVERVIEW

In 2017, we had strong cash generation and significant net debt reduction as a result of improvements in price realization, strict discipline in capital allocation and slightly improved results from nickel and coal assets. We generated net income attributable to our stockholders of US\$5.507 billion in 2017, compared to net income of US\$3.982 billion in 2016. The most significant factors impacting our results in 2017 were (i) higher iron ore realized prices, mainly as a result of the 22% increase of the Platts IODEX iron reference price and gains resulting from higher premiums and commercial initiatives; (ii) higher freight costs and the negative effect of the cost factors that are directly linked to the prices of our products, such as exchange rate variations and bunker oil prices; and (iii) impairment and other results on non-current assets, which decreased by 85%, to US\$294 million from US\$1.240 billion in 2016.

Our net income from continuing operations in 2017 was US\$6.334 billion in 2017, compared to US\$5.205 billion in 2016, and our Adjusted EBITDA in 2017 was US\$15.338 billion, 28% higher than in 2016 despite the negative impact of the depreciation of the Brazilian *real* (8.4%) and higher bunker oil prices (45%), mainly due to higher realized prices and premiums. Adjusted EBITDA is a non-GAAP measure, which is calculated using operating income or loss plus dividends received and interest from associates and joint ventures, and adding back the amounts charged as (i) impairment and other results on non-current assets and (ii) depreciation, depletion and amortization. See —*Results of operations—Results of operations by segment—Adjusted EBITDA by segment*.

Our capital expenditures reached the lowest level since 2005, totaling US\$3.848 billion in 2017, a 29.8% decrease compared to 2016, as a result of the conclusion of the S11D mine and plant. We received US\$922 million as a result of divestments and sales of assets and interests in certain joint ventures and investments in 2017. We also received dividends and interest from associates and joint ventures in the amount of US\$227 million.

### 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.

In 2016, prices began to rise in February driven by policies and supply restrictions imposed by the Chinese government, which caused iron ore prices to reach a peak of US\$70 per dry metric ton by early May. As expected, steel mills increased their productivity in response to the increase in demand and price, which increased the premium for high-grade ores, such as our iron ore from Carajás, and pellets. Steel mill productivity rates stabilized through August 2016, as well as high-grade material premiums, with high coking coal prices increasing the value perception of high-grade ores even more.

China's steel sector outperformed in 2017, mainly driven by machinery, manufacturing and real estate. The infrastructure sector was quite robust with a relatively loose credit supply in the first three quarters.

Manufactured goods enjoyed healthy external demand driven by strong orders from developed countries and from the ongoing 'Belt and Road Initiative' projects, all leading China to deliver a record-high steel production of 831.7 Mt in 2017, an increase of 5.7% year-on-year as per the World Steel Association.

Global steel production excluding China also posted strong growth in 2017 with 859.5 Mt, an increase of 4.9% year-on-year, as the world enjoys its first synchronized growth since the global financial crisis of 2008 and 2009 as consumption and job creation increased and investments resumed, reflecting in steel demand and production.

As a result of the macroeconomic condition mentioned above, in 2017 there was a decrease in the price spreads between high- and low-quality ores. Improved steel profitability, high coking coal price and the environmental restrictions imposed during 2017 led mills to source high-quality ores like the Carajás iron ore (IOCJ), with around 65% Fe, which provide higher productivity and lower emission levels. While the Metal Bulletin 58% average of US\$ 46.7/dmt in 2017 was only 1% higher year-on-year, the Metal Bulletin 65% average of US\$ 88.0/dmt in 2017 represented an increase of 36% year-on-year.

We believe that 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, should support the demand for high-quality ores that enable productivity and lower emission levels like pellets and IOCJ.

While the increased demand for higher grade ores should support the quality premiums, the relatively strong supply of ores with lower Fe and high contaminant levels should also maintain pressure on the discounts for such products. Iron ore Platts IODEX 62% averaged US\$ 71.3/dmt in 2017, an increase of 22% from 2016, supported by the steel sector outperformance that led to higher steel prices across the world.

In 2018, we expect China's economic growth to moderate from 2017 with some downward risks from property. However, since the property stock level has been reduced, the investments and new starts should see only a small decrease. Global economic prospects continue positive for 2018, as the IMF has recently increased expected GDP growth from 3.6% to 3.9%. Steel demand and production are expected to grow also as new projects in Southeast Asia emerge, a region with steel production deficit and lower steel consumption per capita.

## 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 on the nickel product's physical and technical characteristics. Demand for nickel is strongly affected by stainless steel production, which represents, on average, 69% of global primary nickel consumption in 2017.

We have short-term fixed-volume contracts with customers for the majority of our expected annual nickel sales. These contracts, together with our sales for non-stainless steel applications (alloy steels, high nickel alloys, plating and batteries), provide stable demand for a significant portion of our annual production. In 2017, 63% of our refined nickel sales were made for non-stainless steel applications, compared to the industry average for primary 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 2017, Chinese stainless steel demand represented 44% of total global demand. As a consequence, changes in Chinese stainless steel production have a large impact on global nickel demand. In 2017, Chinese stainless steel production



grew 6% compared to 10% in 2016. Also, the growth in stainless focused on 300-series grade steels, which contains relatively high amounts of nickel, due to superior physical characteristics compared to other austenitic series. We anticipate that demand will continue growing in 2018.

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 2013 and 2017, secondary nickel accounted for approximately 41% 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 20% of the total nickel used for stainless steel, while nickel pig iron, a relatively low-grade nickel product made primarily in China from imported lateritic ores, accounts for approximately 40%.

In recent years, Chinese domestic production of nickel pig iron accounted for the majority of world nickel supply growth. In 2017, approximately 423 thousand metric tons, representing 20% of world primary nickel supply was produced as nickel pig iron in China, mainly using nickel ore from the Philippines. 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 nickel ore exports from Indonesia. In 2017, approximately 20 Mt of ore have been granted for export to various companies and export volumes are expected to continue increasing given lack of government concern on market impacts. Philippines exports are expected to grow as well. Given broad availability of ores for the production of nickel pig iron in China, the bottleneck for production has shifted away from ore availability to nickel pig iron capacity. China had in the second half of 2017 instituted a number of environmental measures to curtail pollution and this has adversely impacted nickel pig iron production. Continued focus of the Chinese government on the environment is likely to continue to impact nickel pig iron production, although we expect nickel pig iron production to continue to grow in 2018 relative to 2017.

The nickel market was in deficit in 2017 by approximately 80-90kt. Global exchange inventories (London Metals Exchange and Shanghai Future Exchange) declined 53,200 tons from January 1, 2017 to December 31, 2017. We expect the market to remain in deficit in 2018.

In the long term, the battery segment shows important upside potential as electric vehicle production continues to attract significant investments, which could positively affect nickel price and our nickel premiums. As currently foreseeable, commercially viable electric vehicle battery technologies utilize nickel; increasing nickel content in such batteries results in improved energy storage and lower cost. As a result, nickel demand is expected to surge, 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 and the NYMEX, 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 grew by approximately 2% in 2017, with China responsible for approximately 48% of worldwide consumption. Predominant use of copper in China was in construction and in the



electrical grid. In 2017, numerous supply disruptions particularly at the world's largest mines due to labor negotiations and government disputes impacted the copper industry. As a result, mine production was approximately 0.4% lower compared to 2016. In the second half of the year, demand in China as well as a positive macroeconomic environment helped improve copper prices. We anticipate that the market will reach a balance in 2018, as demand continues to grow and projects complete ramping up.

## Coal

Demand for metallurgical coal is fundamentally driven by steel demand, and future growth continues to be expected in Asia. Asia, including India, accounts for more than half of the steel market and consumes approximately 75% of seaborne metallurgical coal. Chinese total coking coal imports increased by 17% to almost 70 million metric tons in 2017 compared to approximately 59 million metric tons imported in 2016. In 2017, China accounted for approximately 16% of total coking coal imports. Global demand excluding China is expected to increase by approximately 2.5% in 2017, compared to 2016, mainly driven by India, South America and Southeast Asia while demand in Europe was stable.

The Chinese government has implemented a number of policies in order to conduct structural reforms and address oversupply capacity, while improving overall safety standards and the long-term competitiveness of its domestic coal industry. In 2016, total closures reached 290Mt and the Chinese government set up plans to cut an additional 150Mt in 2017, which was later revised to 200Mt. The Chinese government is on track to meet the overall closure target of 800Mt by 2020. In order to improve air condition during a period between early November and late March, the Chinese government enforced curtailment in ironmaking and coke production in the Hebei, Henan, Shanxi, Shandong and Tianjin regions, while Chinese mines have not been asked to cut production, resulting in softening domestic coking coal prices compared to international coking coal prices.

In the international market, price volatility continued in 2017. Premium coking coal average price climbed 37% year-on-year from US\$143 per metric ton in 2016 to US\$187 per metric ton. Premium coking coal prices started the year on a downward trend, dropping from US\$230 per metric ton to US\$153 per metric ton in late March, before soaring to US\$302 per metric ton on the back of supply disruptions in Australia due to Cyclone Debby. Prices rapidly corrected to US\$139 per metric ton in mid-June and have since increased to US\$180 and US\$200 per metric ton as a result of high steel margins and strong demand in China. Further supply tightness in Australia due to prolonged port maintenance and a number of mining issues caused a price rally and seaborne prices ended 2017 at US\$262 per ton. The price of metallurgical coal on January 15, 2018 was US\$259 per ton.

Demand for thermal coal is closely related to electricity consumption, which continues to be driven by global economic growth and urbanization, with the highest levels of growth found in Asia and emerging markets. Global power demand increased 3% year on year and thermal coal demand climbed 2% year on year. The Chinese seaborne coal import posted a second year in a row increase and is expected to reach approximately 180 million metric tons in 2017, up 7.3% year on year, as a result of low hydropower generation. Demand in Asian countries (excluding China) has also been strong, and coal share in power generation increased from 44% to slightly above 45%. Coal consumption for power generation has fallen for the fifth consecutive year in Europe, and demand is estimated to drop by 5% year on year. The European seaborne import decrease was largely impacted by the decline in coal consumption in the UK and Germany, and continued competition against gas. However, short-term factors, such as the strikes in exporting countries, low water levels in Europe reducing hydropower generation and nuclear and gas supply issues have kept demand volatile. In India, year-on-year thermal coal demand remained firm, and seaborne imports will increase by 1.8% in 2017, compared to 2016, as growth in domestic production will be weaker than demand. The power sector in India is expected to grow in the near term and domestic

production plans set by the Indian government are unlikely to reach targets due to a number of land acquisition issues and infrastructure projects.

Thermal coal prices were stable in 2017, mainly due to strong demand in Asia and short-term supply factors. The Newcastle Index average in 2017 reached US\$88.4 per ton, up 33% year on year, while the Richards Bay Coal Index increased by 32% to US\$84.8 per ton. Amid supply tightness during the winter season in the northern hemisphere, prices rose in the second half of 2017, tracking above the US\$100 per metric ton threshold.

Climate change policies may continue to adversely impact coal demand in Europe, North America and China. However, consumption in other developing Asian economies is expected to expand. On the supply side, current investments are low and the lack of new project development is expected to impact supply and demand balance by 2020, at which point prices will be set by incentive prices.

### **SALE OF FERTILIZER BUSINESS**

As part of our ongoing efforts to optimize the structure of our portfolio of businesses in order to achieve the most efficient allocation of capital, in December 2016 we entered into an agreement with Mosaic for the sale of our Fertilizers business, including assets in Brazil, Peru and Canada. As a result of this agreement, we report operational and financial results for our fertilizers business in the income statements under “discontinued operations.” Therefore, unless otherwise indicated, all figures presented in the forefront of this annual report do not include the results of the fertilizers business. In January 2018, we concluded this transaction, after the parties agreed on final adjustments to the terms and conditions, as a result of which we recognized an impairment loss of US\$729 million in our results of discontinued operations in 2017.

In November 2017, we entered into an agreement to sell our nitrogen assets located in Cubatão, Brazil to Yara International ASA, for which we recognized an impairment loss of US\$156 million in our results of discontinued operations in 2017.

### **IMPAIRMENT CHARGES**

In recent years, we have recognized significant impairments of our assets and investments, attributable to a variety of factors. In 2017, we recognized impairment charges totaling US\$271 million, compared to US\$1,174 million in 2016 and US\$8,412 million in 2015. The most significant single impairment in 2017 was for an underground mine in Sudbury that was affected by seismic activities, for which the cost to repair the asset is deemed not recoverable in the current market conditions. We have placed this asset on care and maintenance and an impairment of US\$133 was recognized in the income statement.

### **FAILURE OF SAMARCO’S FUNDÃO TAILINGS DAM**

We own a 50% interest in Samarco and account for it under the equity method. Below is a summary of the impact of the failure of Samarco’s dam in our financial statements:

- The carrying value for our investment in Samarco was reduced to zero in 2015.
- In June 2016, pursuant to the Framework Agreement, Samarco, Vale S.A. and BHPB created the Fundação Renova to develop and implement remediation and compensation programs over many years. The Framework Agreement provides that to the extent that Samarco does not meet its funding obligations to the foundation, each of Vale S.A. and BHPB must provide

funds to the foundation in proportion to its 50% equity interest in Samarco. As a result of uncertainty related to the timing of Samarco's resumption of operations and expected cash flows, we recognized a provision for estimated costs. The amount of provisions related to Samarco as of December 31, 2017 is US\$996 million (compared to US\$1.077 billion as of December 31, 2016). 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 2017, we contributed R\$753 million (US\$237 million) to Samarco, which was allocated as follows: (i) R\$300 million (US\$95 million) was used by Samarco in the reparation programs in accordance with the Framework Agreement, and deducted from the provision, and (ii) R\$453 million (US\$142 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 intend to make available short-term facilities of up to US\$48 million to support Samarco's operations during the first half of 2018, and the expenses related to the experts named pursuant to the preliminary agreements with the MPF, signed in January 2017. These funds will be released as needed, but we have not undertaken an obligation to Samarco. BHPB has stated that it will make available to Samarco short-term facilities with similar terms and conditions.
- Upon creation of the foundation, Samarco transferred to the foundation most of the reparation and compensation programs. Therefore, we made contributions to the foundation in the total amount of R\$239 million (US\$71 million) and R\$640 million (US\$199 million) in 2016 and 2017, respectively and we expect to contribute with R\$432 million (US\$133 million) in the first half of 2018, to be used in the programs in accordance with the Framework Agreement.

## EFFECT OF CURRENCY EXCHANGE VARIATION

Our results are affected in several ways by changes in the Brazilian *real* exchange rate. Year-end exchange rate variations impact our financial results, while the average exchange rate impacts our operational performance.

In 2017, the Brazilian *real* depreciated 2% against the U.S. dollar, from an exchange rate of R\$3.26 to US\$1.00 on December 31, 2016 to R\$3.31 to US\$1.00 on December 31, 2017. The most important effects were non-cash losses, as described below.

- Most of our debt is denominated in currencies other than the Brazilian *real*, principally the U.S. dollar (US\$18.072 billion as of December 31, 2017, not including accrued charges). Because the functional currency of our parent company for accounting purposes is the Brazilian *real*, changes in the value of the U.S. dollar against the Brazilian *real* result in exchange gain or loss on our net liabilities. In 2017, our net foreign exchange loss of US\$463 million mainly relates to exchange losses on our net U.S. dollar-denominated liabilities, due to the depreciation of the Brazilian *real* against the U.S. dollar.
- We had *real*-denominated debt of US\$3.883 billion as of December 31, 2017, 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 *reais* 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 2017, we had fair value losses on our currency derivatives of US\$313 million. For more information on our use of derivatives, see *Risk management*.

In 2017, the annual average exchange rate for Brazilian *reais* against the U.S. dollar appreciated by 8%, from an average exchange rate of R\$3.48 to US\$1.00 in 2016 to R\$3.19 to US\$1.00 in 2017. This had a negative 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 most of our cost of goods sold are denominated in other currencies, including the Brazilian *real* (52% in 2017), and the Canadian dollar (12% in 2017). As a result, the appreciation of the Brazilian *real* and other currencies against the U.S. dollar increased our costs and expenses by US\$725 million.

In January 2017, Vale implemented hedge accounting for the foreign currency risk arising from its net investments in Vale International and Vale Austria. Under the hedge accounting program, our debt denominated in U.S. dollars and Euros will serve as a hedge instrument for Vale S.A. investments in Vale International and Vale Austria. With the program, the impact of exchange rate variations over debt denominated in U.S. dollars and Euros will be partially recorded under other comprehensive income, reducing volatility of financial performance.

## CHANGES IN ACCOUNTING POLICIES

Certain new accounting standards that are relevant to our activities became effective for our accounting periods beginning after January 1, 2018 or later periods. We decided not to adopt early any of these standards, and therefore they have not impacted our financial statements as of and for the year ended December 31, 2017. The key changes to accounting policies are described below:

- IFRS 9—Financial Instruments (“IFRS 9”) is applicable for annual periods beginning on or after January 1, 2018. This standard addresses the classification and measurement of financial assets and liabilities, and provides for new impairment model and new rules for hedge accounting. We have reviewed our financial assets and liabilities and concluded that IFRS 9 is not expected to cause a material impact on our financial statements for 2018.
- IFRS 15—Revenue from Contracts with Customers (“IFRS 15”) is applicable for annual periods beginning on or after January 1, 2018. IFRS 15 provides a single comprehensive accounting model for recognition of revenue arising from contracts with customers based on a core principle that revenue is recognized at the time the control of a good or service is transferred to a customer and in an amount that reflects the consideration expected to be received in exchange for the transfer of this good or service. IFRS 15 will not impact revenue recognition for most of our contracts, since usually the transfer of risks and rewards and the transfer of control are at the same point in time.

Under IFRS 15, for contracts in which we are responsible for providing shipping services after the date of transfer of control of goods to customers (sales under CFR or CIF Incoterms), the provision of shipping services will be accounted for as a separate performance obligation, and a portion of the transaction price will be allocated to such services and recognized over time. We believe that the impact on the timing of revenue recognition will not significantly impact our financial statements for 2018. Therefore, we will not present this revenue separately in our financial statements.

- IFRS 16—Leases (“IFRS 16”) will become effective for annual periods beginning on or after January 1, 2019. IFRS 16 eliminates the distinction between operating and finance leases for lessees, and requires that most leases be reflected on the lessee’s balance sheet as a right-of-use asset and a lease liability.

We are reviewing our main contracts to evaluate the potential impact of IFRS 16 on our consolidated financial statements. It is not yet possible to estimate the amount of right-of-use assets and lease liabilities that will have to be recognized upon the adoption of the new standard and how this may affect the our financial statements.

For more information, see note 2.e and note 31 to the consolidated financial statements.

# RESULTS OF OPERATIONS

## CONSOLIDATED REVENUES

In 2017, our net operating revenues from continuing operations increased by 23.57% to US\$33.967 billion, primarily resulting from higher realized prices for iron ore fines and pellets (an impact of US\$4.162 billion on our net revenues) and higher sales volumes of pellets (an impact of US\$330 million on our net revenues). Our net operating revenues were also positively impacted by higher prices for base metals (positive impact of US\$1.029 billion). Net operating results of each segment are discussed below under —*Results of operations by segment*.

Our revenue depends, among other factors, on the volume of production at our facilities and the prices for our products. We publish a quarterly production report that is available on our website and furnished to the SEC on Form 6-K. 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 the periods indicated, the distribution of our net operating revenues of continuing operations based on the geographical location of our customers.

	Net operating revenues by destination					
	2015		2016		2017	
	(US\$ million)	(% of total)	(US\$ million)	(% of total)	(US\$ million)	(% of total)
<b>North America</b>						
Canada .....	1,122	4.8%	1,172	4.3%	1,310	3.9%
United States .....	855	3.7	1,005	3.6	1,008	3.0
	<u>1,977</u>	<u>8.5</u>	<u>2,177</u>	<u>7.9</u>	<u>2,318</u>	<u>6.8</u>
<b>South America</b>						
Brazil .....	2,017	8.6	2,064	7.5	3,475	10.2
Other .....	377	1.6	354	1.3	664	2.0
	<u>2,394</u>	<u>10.2</u>	<u>2,418</u>	<u>8.8</u>	<u>4,139</u>	<u>12.2</u>
<b>Asia</b>						
China .....	9,095	38.9	12,747	46.4	14,018	41.3
Japan .....	1,959	8.4	1,741	6.3	2,456	7.2
South Korea .....	790	3.4	880	3.2	1,399	4.1
Taiwan .....	620	2.6	621	2.3	700	2.1
Other .....	830	3.5	889	3.2	1,483	4.4
	<u>13,294</u>	<u>56.8</u>	<u>16,878</u>	<u>61.4</u>	<u>20,056</u>	<u>59.0</u>
<b>Europe</b>						
Germany .....	1,433	6.1	1,379	5.0	1,389	4.1
United Kingdom .....	399	1.7	326	1.2	346	1.0
Italy .....	461	2.0	435	1.6	521	1.5
France .....	331	1.4	429	1.6	551	1.6
Other .....	1,905	8.1	2,079	7.5	2,695	7.9
	<u>4,529</u>	<u>19.4</u>	<u>4,648</u>	<u>16.9</u>	<u>5,502</u>	<u>16.2</u>
<b>Rest of the world</b> .....	<u>1,190</u>	<u>5.1</u>	<u>1,367</u>	<u>5.0</u>	<u>1,952</u>	<u>5.7</u>
Total .....	<u>23,384</u>	<u>100.0%</u>	<u>27,488</u>	<u>100.0%</u>	<u>33,967</u>	<u>100.0%</u>

## CONSOLIDATED OPERATING COSTS AND EXPENSES

Our cost of goods sold and services rendered from continuing operations totaled US\$21.039 billion in 2017, increasing by 19.2%, or US\$3.389 billion, from the US\$17.650 billion recorded in 2016. Higher costs were mostly driven by (i) higher iron ore prices (US\$695 million), resulting in higher leasing costs of

pelletizing plants, royalties, costs of feed purchased from third parties and provision for profit-sharing payments to employees; and (ii) other exogenous factors, such as the negative impacts of exchange rate variations on costs (US\$655 million) and bunker oil prices (US\$409 million), higher freight costs (US\$267 million) and higher energy costs (US\$215 million).

Our selling, general, administrative and other expenses from continuing operations increased by 29.7% in 2017, mostly due to the one-off positive effect from the goldstream transaction (US\$150 million) in 2016. We increased our research and evaluation expenses by 6.3%, to US\$340 million in 2017 from US\$320 million in 2016. Our pre-operating and stoppage expenses decreased by US\$280 million in 2017, primarily because of the lower pre-operating expenses in Long Harbour and Mozambique as their ramp-ups mature and therefore started to be accounted for as costs in 2017. These reductions were partially offset by higher pre-operating expenses in S11D, due to the start of the ramp-up.

## RESULTS OF OPERATIONS BY SEGMENT

### Net operating revenue by segment

The following table summarizes our net operating revenues by product for the periods indicated.

	Year ended December 31,				2017
	2015	% change	2016	% change	
	(US\$ million, except for %)				
Ferrous minerals:					
Iron ore.....	12,330	28.0 %	15,784	17.4%	18,524
Pellets .....	3,600	6.3	3,827	47.7	5,653
Ferroalloys and manganese .....	162	86.4	302	55.3	469
Other ferrous products and services.....	470	(6.8)	438	10.3	483
Subtotal .....	16,562	22.9	20,351	23.5	25,129
Coal .....	526	59.5	839	86.8	1,567
Base metals:					
Nickel and other products(1) .....	4,693	(4.7)	4,472	4.4	4,667
Copper concentrate(2).....	1,470	13.4	1,667	32.2	2,204
Subtotal .....	6,163	(0.4)	6,139	11.9	6,871
Other products and services(3) .....	133	19.5	159	151.6	400
Net operating revenues .....	23,384	17.6 %	27,488	23.6%	33,967

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

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

(3) Includes energy.

### Sales volumes

The following table sets forth, for our principal products, the total volumes we sold in each of the periods indicated.

	Year ended December 31,		
	2015	2016	2017
	(thousand metric tons, except where indicated)		
Ferrous minerals:			
Iron ore fines.....	276,393	289,940	288,692
Pellets.....	46,284	47,709	51,775
Manganese.....	1,764	1,851	1,826
Ferroalloys.....	69	127	132
ROM.....	12,269	3,496	2,637
Coal:			
Thermal coal.....	892	5,457	4,602
Metallurgical coal.....	5,614	4,907	7,178
Base metals:			
Nickel.....	292	311	295
Copper.....	397	430	424
PGMs (000' oz.).....	519	507	350
Gold (000' oz.).....	425	497	471
Silver (000' oz.).....	2,303	2,578	2,179
Cobalt (metric tons).....	3,840	4,734	5,103

### Average realized prices

The following table sets forth our average realized prices for our principal products for each of the periods 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,		
	2015	2016	2017
	(US\$ per metric ton, except where indicated)		
Ferrous minerals:			
Iron ore.....	44.61	54.44	64.17
Pellets.....	77.79	80.26	109.18
Manganese.....	56.42	110.87	159.01
Ferroalloys.....	899.32	757.67	1,353.72
Coal:			
Thermal coal.....	52.36	46.17	71.05
Metallurgical coal.....	85.55	119.54	172.69
Base metals:			
Nickel.....	11,684.30	9,800.00	10,654.00
Copper.....	4,352.94	4,458.00	5,970.00
Platinum (US\$/oz).....	1,020.14	919.00	891.00
Gold (US\$/oz).....	1,123.07	1,260.49	1,247.00
Silver (US\$/oz).....	12.63	16.22	15.30
Cobalt.....	21,936.00	24,273.00	51,513.00

### Cost of goods sold by segment

The following table presents, for each indicated period, our cost of goods sold by segment and the percentage change from year to year. Because significant portions of changes in our cost of goods sold



may derive from exchange rate variations, we also present in the table below the effect of exchange variations and the changes on a constant currency basis.

	Year ended December 31,					
	2017	2016	2017			
	Cost of goods sold	Cost of goods sold	Variation as reported	Exchange rate impact in 2017	Variation without exchange rate impact	Variation - constant currency basis
	(US\$ million, except for %)					
Ferrous minerals:						
Iron ore .....	7,950	6,622	20.1%	330	998	14.4%
Pellets .....	2,876	2,002	43.7	110	764	36.2
Ferroalloys and manganese .....	278	231	20.3	14	33	13.5
Other ferrous products and services .....	306	269	13.8	36	1	0.3
Subtotal .....	11,410	9,124	25.1	490	1,796	18.7
Coal .....	1,354	872	55.3	0	482	55.3
Base metals:						
Nickel and other products(1) .....	3,437	3,204	7.3	64	169	5.2
Copper(2) .....	979	924	6.0	81	(26)	(2.6)
Subtotal .....	4,416	4,128	7.0	145	143	3.3
Other .....	375	259	44.8	20	96	34.4
Total (excluding depreciation) .....	17,555	14,383	22.1	655	2,517	16.7
Depreciation .....	3,484	3,267	6.6	159	58	1.7
Total (including depreciation) .....	21,039	17,650	19.2%	814	2,575	13.9%

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

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

	Year ended December 31,					
	2016	2015	2016			
	Cost of goods sold	Cost of goods sold	Variation as reported	Exchange rate impact in 2017	Variation without exchange rate impact	Variation - constant currency basis
	(US\$ million, except for %)					
Ferrous minerals:						
Iron ore .....	6,622	7,604	(12.9)%	(148)	(834)	(11.2)%
Pellets .....	2,002	2,121	(5.6)	(51)	(68)	(3.2)
Ferroalloys and manganese .....	231	175	32.0	(6)	62	36.6
Other ferrous products and services .....	269	341	(21.1)	(13)	(59)	(18.3)
Subtotal .....	9,124	10,241	(10.9)	(218)	(899)	(9.0)
Coal .....	872	839	3.9	(3)	36	4.3
Base metals:						
Nickel and other products(1) .....	3,204	3,393	(5.6)	(86)	(103)	(3.1)
Copper(2) .....	924	903	2.3	(37)	58	6.7
Subtotal .....	4,128	4,296	(3.9)	(123)	(45)	(1.1)
Other .....	259	139	86.3	(6)	126	95.3
Total (excluding depreciation) .....	14,383	15,515	(7.3)	(350)	(782)	(5.2)
Depreciation .....	3,267	3,236	1.0	(113)	144	4.6
Total (including depreciation) .....	17,650	18,751	(5.9)%	(463)	(638)	(3.5)%

(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 impairment charges)

The following table summarizes, for each indicated period, our expenses (including selling, general and administrative, research and evaluation, pre-operating, stoppage and other expenses, net of other revenues) by segment and the percentage change from year to year. Because significant portions of changes in our expenses may derive from exchange rate variations, we also present in the table below the

effect of exchange variations and the changes on a constant currency basis. The table excludes the effect of impairment charges. See—*Impairment charges*.

	Year ended December 31,					Variation - constant currency basis
	2017	2016	2017			
	Expenses	Expenses	Variation as reported	Exchange rate impact in 2017	Variation without exchange rate impact	
	(US\$ million, except for %)					
Ferrous minerals:						
Iron ore .....	553	727	(23.9)%	55	(229)	(29.3)%
Pellets .....	91	108	(15.7)	8	(25)	(21.6)
Ferroalloys and manganese.....	16	15	6.7	1	–	–
Other ferrous products and services ...	(3)	14	(121.4)	1	(18)	(120.0)
Subtotal .....	657	864	(24.0)	65	(272)	(29.3)
Coal.....	62	21	195.2	1	40	181.8
Base metals:						
Nickel and other products(1) .....	276	287	(3.8)	(2)	(9)	(3.2)
Copper(2) .....	40	30	33.3	2	8	25.0
Other base metals.....	–	(150)	(100.0)	0	150	(100.0)
Subtotal .....	316	167	89.2	0	149	89.2
Others .....	445	274	62.4	17	154	52.9
Total (excluding depreciation) .....	1,480	1,326	11.6	83	71	5.0
Depreciation .....	224	220	1.8	10	(6)	(2.6)
Total (including depreciation) .....	1,704	1,546	10.2%	93	65	4.0%

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

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

	Year ended December 31,					Variation - constant currency basis
	2016	2015	2016			
	Expenses	Expenses	Variation as reported (US\$ million, except for %)	Exchange rate impact in 2016	Variation without exchange rate impact	
Ferrous minerals:						
Iron ore .....	727	643	13.1%	(23)	107	17.3%
Pellets .....	108	19	468.4	-	89	468.4
Ferroalloys and manganese .....	15	18	(16.7)	(1)	(2)	(11.8)
Other ferrous products and services ..	14	(3)	(566.7)	2	15	(1500.0)
Subtotal .....	864	677	27.6	(22)	209	31.9
Coal.....	21	223	(90.6)	(1)	(201)	(90.5)
Base metals:						
Nickel and other products(1) .....	287	668	(57.0)	-	(381)	(57.0)
Copper(2) .....	30	41	(26.8)	(1)	(10)	(25.0)
Other base metals.....	(150)	(230)	(34.8)	-	80	(34.8)
Subtotal .....	167	479	(65.1)	(1)	(311)	(65.1)
Others .....	274	294	(6.8)	4	(24)	(8.1)
Total (excluding depreciation) .....	1,326	1,673	(20.7)	(20)	(327)	(19.8)
Depreciation .....	220	483	(54.5)	(6)	(257)	(53.9)
Total (including depreciation) .....	1,546	2,156	(28.3)%	(26)	(584)	(27.4)%

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

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

### Adjusted EBITDA by segment

Our management uses adjusted EBITDA to assess each segment's contribution to our performance and to support decisions about resource allocation. Adjusted EBITDA is a non-GAAP measure, which is calculated for each segment using operating income or loss plus dividends received and interest from associates and joint ventures, and adding back the amounts charged as (i) impairment and other results on non-current assets and (ii) depreciation, depletion and amortization. For more information, see note 3 to our consolidated financial statements.

The table below shows a reconciliation of our consolidated Adjusted EBITDA from continuing operations with our net income (loss) from continuing operations for the years ended December 31, 2017, 2016 and 2015.

	Year ended December 31,		
	2015	2016	2017
	(US\$ million)		
<b>Income (loss) from continuing operations attributable to Vale's stockholders</b> .....	(11,929)	5,211	6,313
Income (loss) attributable to noncontrolling interests .....	(501)	(8)	21
<b>Income (loss) from continuing operations</b> .....	(12,430)	5,203	6,334
Income taxes .....	(5,249)	2,781	1,495
Impairment and others results in associates and joint ventures .....	349	1,220	180
Equity results in associates and joint ventures .....	445	(309)	(98)
Financial results, net .....	10,654	(1,843)	3,019
<b>Operating income (loss)</b> .....	(6,231)	7,052	10,930
Impairment and other results on non-current assets .....	8,708	1,240	294
Dividends received and interest from associates and joint ventures .....	318	193	406
Depreciation, depletion and amortization .....	3,719	3,487	3,708
<b>Adjusted EBITDA from continuing operations</b> .....	6,514	11,972	15,338
Adjusted EBITDA from discontinued operations (Fertilizers) .....	567	209	4
<b>Total Adjusted EBITDA</b> .....	7,081	12,181	15,342

The following table summarizes our consolidated Adjusted EBITDA for each of our segments.

	Year ended December 31,		
	2015	2016	2017
	Adjusted EBITDA	Adjusted EBITDA	Adjusted EBITDA
	(US\$ million)		
<b>Ferrous minerals:</b>			
Iron ore .....	4,105	8,445	10,051
Pellets .....	1,685	1,820	2,767
Ferroalloys and manganese .....	(31)	56	175
Other ferrous products and services .....	140	155	199
Subtotal .....	5,899	10,476	13,192
Coal .....	(508)	(54)	330
<b>Base metals:</b>			
Nickel and other products(1) .....	632	985	954
Copper(2) .....	526	713	1,185
Other .....	230	150	-
Subtotal .....	1,388	1,848	2,139
Other(3) .....	(265)	(298)	(323)
<b>Total Adjusted EBITDA from continuing operations</b> .....	6,514	11,972	15,338
Adjusted EBITDA from discontinued operations (Fertilizers) .....	567	209	4
<b>Total Adjusted EBITDA</b> .....	7,081	12,181	15,342

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

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

(3) Includes energy.

We discuss below, for each segment, the changes in our net operating revenues, cost of goods sold (excluding depreciation, depletion and amortization), expenses (excluding depreciation, depletion and amortization and excluding impairment charges) and Adjusted EBITDA.

### Ferrous minerals

#### 2017 compared to 2016

- *Our net operating revenues from sales of ferrous minerals* increased by 23.5%, from US\$20.351 billion in 2016 to US\$25.129 billion in 2017, reflecting higher realized prices, higher premiums and lower discounts. Our average realized prices in 2017 were 17.9% and 36.0% higher than our average realized prices in 2016 for iron ore and iron ore pellets, respectively. Our iron ore sales volume reached 288.7 Mt in 2017, in line with 2016, mainly due to the S11D ramp-up, offset by the curtailment of high silica products in the Southern and Southeastern Systems and build-up of offshore inventories.
- *Our cost of goods sold from ferrous minerals*, excluding depreciation, amortization and depletion, increased by 18.7% on a constant currency basis, mainly as a result of the negative effect of cost factors that are directly linked to iron ore prices, such as higher freight costs (US\$642 million) driven by higher bunker oil prices.
- *Our net expenses from ferrous minerals*, excluding depreciation, amortization and depletion, and excluding impairment charges, decreased by 29.3% on a constant currency basis, mainly due to lower pre-operating expenses in S11D.
- *Our adjusted EBITDA from ferrous minerals* was US\$13.192 billion in 2017, 25.9% higher than the US\$10.476 billion we reported in 2016. The increase was mainly due to higher market prices, higher premiums and the initiatives of supply discipline, portfolio mix management, global supply chain management and focus on cost savings. Dividends received and interest from associates and joint ventures operating in the ferrous minerals segment totaled US\$130 million in 2017, in line with the US\$113 million received in 2016.

#### 2016 compared to 2015

- *Our net operating revenues from sales of ferrous minerals* increased by 22.9%, from US\$16.562 billion in 2015 to US\$20.351 billion in 2016, reflecting higher prices and sales volumes of iron ore and iron ore pellets. Our average realized prices in 2016 were 22.0% and 3.2% higher than our average realized prices in 2015 for iron ore and iron ore pellets, respectively. Our iron ore sales volume increased by 4.9% in 2016 due to improved operational performance of the Northern System.
- *Our cost of goods sold from ferrous minerals*, excluding depreciation, amortization and depletion, decreased by 9.0% on a constant currency basis, mainly as a result of a decrease in our freight costs, in the amount of US\$705 million, the termination in December 2015 of our bunker oil hedge accounting program, which had a negative impact in the amount of US\$460 million on our results for 2015, and other cost-cutting measures implemented in 2016, including the renegotiation and termination of freight charter contracts. The decrease in our costs of goods sold was partially offset by increased costs associated with higher sales volumes, in the amount of US\$446 million.

- *Our net expenses from ferrous minerals*, excluding depreciation, amortization and depletion, and excluding impairment charges, increased by 31.9% on a constant currency basis, mainly due to a reversion of provisions for asset retirement obligations in 2015 in the amount of US\$322 million. We also saw an increase in pre-operating and stoppage expenses from US\$169 million in 2015 to US\$187 million in 2016, mainly as a result of the increase in S11D pre-operating expenses and stoppage expense in our iron ore operations in Mariana, in the state of Minas Gerais.
- *Our adjusted EBITDA from ferrous minerals* was US\$10.476 billion in 2016, 77.6% higher than the US\$5.899 billion we reported in 2015. The increase was mainly due to the increase in market prices (impact of US\$2.727 billion), and also increases in sales volume and a positive impact of exchange rate variations, in the amount of US\$244 million. Dividends received and interest from associates and joint ventures operating in the ferrous minerals segment totaled US\$113 million in 2016 compared to US\$255 million in 2015, reflecting lower dividends, especially due to the lack of dividends from Samarco.

## Coal

### 2017 compared to 2016

- *Our net operating revenues from sales of coal* increased by 86.8%, to US\$1.567 billion in 2017 from US\$839 million in 2016. This increase primarily reflected higher realized prices, for both thermal and metallurgical coal, and higher sales volumes of metallurgical coal. Sales volumes of metallurgical coal totaled 7.178 Mt in 2017, increasing 2.271 Mt as compared to 2016, as a result of ramp-up of our new coal handling processing plant in Moatize and the Nacala Logistic Corridor.
- *Our cost of goods sold from coal*, excluding depreciation, amortization and depletion, increased by 55.3% on a constant currency basis, from US\$872 million in 2016 to US\$1.354 billion in 2017, primarily due to the impact of the logistic tariff applied after we ceased to consolidate NLC in our financial statements.
- *Our net expenses from coal*, excluding depreciation, amortization and depletion, and excluding impairment charges, totaled US\$62 million in 2017, increasing US\$41 million as compared to the US\$21 million recorded in 2016. This increase in net expenses in 2017 mainly derives from adjustments to the net realizable value of the thermal coal inventory in Mozambique.
- *Our adjusted EBITDA from coal* was a gain of US\$330 million in 2017, while in 2016 we had a loss of US\$54 million, reflecting the higher realized prices (US\$386 million) and higher sales volumes from Mozambique (US\$129 million). These higher prices and sales volumes were partially offset by the higher costs and expenses (US\$73 million), due to the impact of the logistics tariff.

### 2016 compared to 2015

- *Our net operating revenues from sales of coal* increased by 59.5%, to US\$839 million in 2016 from US\$526 million in 2015. This increase primarily reflected higher sales prices of metallurgical coal (impact of US\$161 million) and higher sales volumes for thermal coal (impact of US\$208 million) as a result of an increase in logistics capacity with the ramp-up of

the NLC, allowing for the sale of thermal coal inventories. Sales volumes of metallurgical coal totaled 4.907 Mt in 2016, decreasing 707 kt as compared to 2015, as a result of a 33% decrease in sales volumes from Carborough Downs, which faced geological issues in 2016 and was divested in November 2016. Sales volumes of thermal coal reached 5.457 Mt in 2016, compared to 0.892 Mt in 2015.

- *Our cost of goods sold from coal*, excluding depreciation, amortization and depletion, increased by 4.3% on a constant currency basis, from US\$872 million in 2016 to US\$836 million in 2015, as a result of the ramp-up of the NLC.
- *Our net expenses from coal*, excluding depreciation, amortization and depletion, and excluding impairment charges, decreased by 90.5% on a constant currency basis, from US\$222 million in 2015 to US\$21 million in 2016, due to (i) reduced selling, general and administrative expenses in Australia (impact of US\$4 million) and (ii) higher effects of inventory adjustments on thermal coal in Mozambique in 2016 as compared to 2015 (impact of US\$165 million).
- *Our adjusted EBITDA from coal* was a loss of US\$54 million in 2016, while in 2015 we had a loss of US\$508 million, reflecting higher coal prices (impact of US\$155 million) and lower costs and expenses, adjusted by the impact of higher volumes and exchange rate variation (impact of US\$386 million).

## Base metals

### 2017 compared to 2016

- *Our net operating revenues from sales of base metals* totaled US\$6.871 billion in 2017, a 12% increase from US\$6.139 billion in 2016. The increase was mainly driven by higher sales prices for nickel (US\$257 million), copper (US\$642 million) and cobalt (US\$138 million).
- *Our cost of goods sold from base metals*, excluding depreciation, amortization and depletion, increased 3.3% on a constant currency basis. After adjusting for the effects of lower volumes (US\$94 million), costs increased by US\$237 million compared to 2016 mainly as a result of higher nickel costs (US\$ 353 million) due to the transition to a simpler and more efficient nickel flowsheet in the North Atlantic operations and the increase of nickel unit costs because of lower production volumes. The cost increase was partially offset by lower copper costs (US\$ 116 million).
- *Our net expenses from base metals*, excluding depreciation, amortization and depletion, and excluding impairment charges, increased 89.20% on a constant currency basis, mainly due to the one-off positive effects from goldstream transactions totaling US\$150 million in 2016.
- *Our adjusted EBITDA from base metals* was US\$2.139 billion in 2017, a 15.7% increase from the US\$1.848 billion recorded in 2016. The increase was mainly due to higher realized prices for copper, nickel and cobalt. These price effects were partially offset by higher costs (US\$ 237 million), lower volumes (US\$ 203 million), higher expenses (US\$ 148 million), and the unfavorable effect of exchange rate variations (US\$ 150 million).



## 2016 compared to 2015

- *Our net operating revenues from sales of base metals* totaled US\$6.139 billion in 2016, a 0.4% decrease from US\$6.163 billion in 2015. The decrease was mainly driven by lower nickel prices (US\$544 million), which were partially offset by higher sales of nickel (US\$182 million) and copper (US\$144 million), higher prices for gold, cobalt and silver byproducts (US\$101 million) and higher volumes for gold, cobalt and silver byproducts (US\$89 million). The increase in nickel sales volumes was primarily driven by the ramp up of our operations in New Caledonia and at Long Harbour. The increase in copper sales volumes was mainly the result of higher copper production in Sudbury and the completed ramp up of operations at Salobo.
- *Our cost of goods sold from base metals, excluding depreciation, amortization and depletion*, decreased 1.1% on a constant currency basis. After adjusting for the effects of higher volumes (US\$260 million), costs decreased by US\$305 million compared to 2015 mainly as a result of higher production in Sudbury and the conclusion of the ramp-up of Salobo operations resulting in dilution of fixed costs, lower fuel costs at PTVI and lower planned shutdown maintenance costs at our Canadian operations.
- *Our net expenses from base metals, excluding depreciation, amortization and depletion, and excluding impairment charges*, decreased 65.1% on a constant currency basis, mainly due to lower pre-operating expenses reflecting the full transition of VNC costs from pre-operating expenses to costs of goods sold (impact of US\$287 million), partially offset by the effects from goldstream transactions totaling US\$150 million in 2016.
- *Our adjusted EBITDA from base metals* was US\$1.848 billion in 2016, a 33.1% increase from 2015. The increase was mainly due to lower expenses and costs (impact of US\$617 million), higher nickel and copper sales volumes (US\$148 million) and exchange variation (US\$126 million), which was partially offset by lower prices (US\$431 million).

## FINANCIAL RESULTS, NET

The following table details our net financial results, net, from continuing operations for the periods indicated.

	Year ended December 31,		
	2015	2016	2017
		(US\$ million)	
Financial income(1).....	251	170	481
Financial expenses(2).....	(1,068)	(2,677)	(3,276)
Gains (losses) on derivatives, net.....	(2,477)	1,256	454
Foreign exchange gains (losses), net.....	(7,044)	3,252	(463)
Indexation losses, net.....	(316)	(158)	(215)
Financial results, net.....	(10,654)	1,843	(3,019)

(1) Includes short-term investments and other financial income (see note 6 to our consolidated financial statements)

(2) Includes loans and borrowings gross interest, capitalized loans and borrowing costs, financial expenses associated with labor, tax and civil lawsuits, participative stockholders' debentures, expenses of REFIS and others financial expenses (see note 6 to our consolidated financial statements).

### 2017 compared to 2016.

In 2017, our financial results, net, was a loss of US\$3.019 billion, compared to an income of US\$1.843 billion in 2016. This principally resulted from:

- Net foreign exchange losses of US\$463 million in 2017 compared to net foreign exchange gains of US\$3.252 billion in 2016, principally due to the depreciation of the Brazilian *real* against the U.S. dollar.
- The net effect of fair value changes in derivatives, which represented a gain of US\$454 million in 2017 compared to a gain of US\$1.256 billion in 2016. This reflected the following main categories of derivatives transactions:
  - *Currency and interest rate swaps.* We recognized gains of US\$313 million in 2017 from currency and interest rate swaps, compared to a gain of US\$959 million in 2016. These swaps are primarily used to convert debt denominated in other currencies into U.S. dollars in order to protect our cash flow from exchange rate volatility.
  - *Nickel derivatives.* We recognized a gain of US\$30 million in 2017 compared to a loss of US\$42 million in 2016. These derivatives are part of our nickel price protection program.
  - *Bunker oil derivatives.* We recognized a loss of US\$80 million in 2017 compared to a gain of US\$268 million in 2016. These gains or losses resulted from the fair value of the hedge contracts and the variation is due to the sharp volatility in the spot price of bunker oil.
- A net indexation loss of US\$215 million in 2017 compared to a net loss of US\$158 million in 2016, mainly due to changes in discount rates on asset retirement obligation provisions.

### 2016 compared to 2015.

In 2016, our financial results, net, was income of US\$1.843 billion, compared to an expense of US\$10.654 billion in 2015. This principally resulted from:

- A decrease in financial income from US\$251 million in 2015 to US\$170 million in 2016, as a result of a decrease in our average cash position in 2016, as compared to 2015.
- An increase in financial expenses of US\$1.609 billion, from US\$1.068 billion in 2015 to US\$2.677 billion in 2016, attributable primarily to the US\$1.382 billion increase in the marked-to-market fair value of our shareholder debentures due to an increase in commodities price.
- Net foreign exchange gains of US\$3.252 billion in 2016 compared to net foreign exchange losses of US\$7.044 billion in 2015, principally due to the appreciation of the Brazilian *real* against the U.S. dollar.

- The net effect of fair value changes in derivatives, which represented a gain of US\$1.256 billion in 2016 compared to a loss of US\$2.477 billion in 2015. This reflected the following main categories of derivatives transactions:
  - *Currency and interest rate swaps.* We recognized gains of US\$959 million in 2016 from currency and interest rate swaps, compared to a net loss of US\$1.502 billion in 2015. These swaps are primarily used to convert debt denominated in other currencies into U.S. dollars in order to protect our cash flow from exchange rate volatility.
  - *Nickel derivatives.* We recognized a loss of US\$42 million in 2016 compared to a loss of US\$49 million in 2015. These derivatives are part of our nickel price protection program.
  - *Bunker oil derivatives.* We recognized a gain of US\$268 million in 2016 compared to a loss of US\$742 million in 2015. These gains or losses resulted from the marking to market of the hedge contracts on bunker oil price; for 2016, we had entered in these contracts only in the last quarter of the year, when we resumed hedging the bunker oil price due to the risk of increased oil prices in 2017. As we resumed hedging bunker oil price in the last quarter of 2016, our financial results in 2017 will be impacted by the changes in the fair value of the outstanding derivatives position at the end of each quarter. These derivatives are structured to minimize the volatility of the cost of maritime freight, and the variation is due to the sharp volatility in the spot price of bunker oil.
- A net indexation loss of US\$158 million in 2016 compared to a net loss of US\$316 million in 2015, mainly due to changes in discount rates on asset retirement obligation provisions.

## EQUITY RESULTS IN ASSOCIATES AND JOINT VENTURES

### 2017 compared to 2016.

Our equity results in associates and joint ventures in 2017 was a profit of US\$98 million, compared to a profit of US\$309 million in 2016, mostly due to negative results in 2017 from our equity position in Companhia Siderurgica do Pecém (US\$264 million loss), driven by foreign exchange losses on its U.S. dollar-denominated debt due to appreciation against the Brazilian *real*, compared to a positive result in 2016 from Companhia Siderurgica do Pecém (US\$25 million profit).

### 2016 compared to 2015.

Our equity results in associates and joint ventures increased to a profit of US\$309 million in 2016 from a loss of US\$445 million in 2015, mostly due to the positive results in 2016 from our equity positions in Companhia Siderurgica do Pecém (US\$25 million profit), MRN (US\$48 million profit) and California Steel Industries, Inc.—CSI (US\$32 million profit), as compared to the negative results in 2015 from Samarco (US\$167 million loss), Companhia Siderurgica do Pecém (US\$307 million loss), CSI (US\$27 million loss) and Companhia Siderurgica do Atlântico—CSA (US\$80 million loss).

## IMPAIRMENT AND OTHER RESULTS IN ASSOCIATES AND JOINT VENTURES

### *2017 compared to 2016.*

We recognized a loss resulting from impairment and other results in associates and joint ventures of US\$180 million in 2017, which relates to our investment in Samarco. Samarco impairments were write-downs of the debt instruments used to fund its working capital. We recognized a loss resulting from impairment and other results in associates and joint ventures of US\$1.220 billion in 2016, mainly due to the impairment of US\$1.109 billion in relation to Samarco. See *Business overview—Failure of Samarco’s tailings dam in Minas Gerais* and note 21 to our consolidated financial statements.

### *2016 compared to 2015.*

We recognized a loss resulting from impairment and other results in associates and joint ventures of US\$1.220 billion in 2016, of which US\$1.109 billion related to our investments in Samarco, US\$75 million resulted from the sale of CSA and US\$36 million from the sale of Mineração Paragominas. We recognized a loss resulting from impairment and other results in associates and joint ventures of US\$349 million in 2015, of which US\$446 million related to impairment from our investments in Teal Minerals (US\$314 million) and Samarco (US\$132 million), which was partially offset by a gain in the sale of our participation in Shandong Yankuang (US\$79 million), a coking coal producer, and a gain in the disposal of energy generation assets (US\$18 million).

## RESULTS OF DISCONTINUED OPERATIONS

### *2017 compared to 2016.*

In 2017, we had a net loss from discontinued operations attributable to Vale’s stockholders of US\$806 million, compared to a loss of US\$1.229 billion in 2016. In December 2016, we entered into an agreement with Mosaic to sell a significant part of our fertilizer business. In January 2018, we concluded the transaction with Mosaic, which was preceded by final adjustments under the original terms and conditions of the negotiation. As consequence of these adjustments, an impairment loss of US\$729 million was recognized in 2017. Additionally, in November 2017, we entered into an agreement with Yara International ASA to sell our nitrogen assets located in Cubatão, Brazil and an impairment loss of US\$156 million was recognized in 2017. For more information on our discontinued operations see note 14 to our consolidated financial statements.

### *2016 compared to 2015.*

In 2016, we had a net loss from discontinued operations attributable to Vale’s stockholders of US\$1.229 billion, compared to a loss of US\$200 million in 2015. In December 2016, we entered into an agreement with Mosaic to sell a significant part of our fertilizer business. As a result of this transaction, our fertilizer business is being reported as discontinued operations in our financial statements for the year ended December 31, 2016, and we re-presented our financial statements for the years ended December 31, 2015 and 2014 accordingly. The net assets of our fertilizer business in our balance sheet as of December 31, 2016 were adjusted to reflect their fair value minus the cost to sell the business, and we recognized a loss in the amount of US\$1.738 billion (US\$1.147 billion, net of taxes) in “loss from discontinued operations” in our income statement for the year ended December 31, 2016.

## INCOME TAXES

### *2017 compared to 2016.*

In 2017, we recorded net income tax expense of US\$1.495 billion, compared to a net income tax expense of US\$2.781 billion in 2016. In 2017, our effective tax rate was 19.1%. The effective tax rate was slightly different from the statutory rate mainly due to US\$432 million of unrecognized tax on current year losses, partially offset by the tax benefit from interest on stockholders' equity and the tax incentives for our iron ore, copper and nickel operations in the North and Northeast regions of Brazil. The incentives are calculated based on the taxable income of the incentive activity (tax operating income), taking into account the allocation of tax operating income to different tranches of production during the periods specified for each product. In 2017, this tax incentive structure reduced our net income tax expense by US\$1.100 billion.

### *2016 compared to 2015.*

For 2016, we recorded net income tax expense of US\$2.781 billion, compared to a net income tax gain of US\$5.249 billion in 2015. In 2016, our effective tax rate was 34.8%. The effective tax rate was slightly different from the statutory rate mainly due to US\$708 million of unrecognized tax on current year losses, partially offset by the tax incentives for our iron ore, copper and nickel operations in the North and Northeast regions of Brazil. The incentives are calculated based on the taxable income of the incentive activity (tax operating income), taking into account the allocation of tax operating income to different tranches of production during the periods specified for each product. In 2016, this tax incentive structure reduced our net income tax expense by US\$344 million.

# LIQUIDITY AND CAPITAL RESOURCES

## OVERVIEW

In the ordinary course of business, our principal funding requirements are for capital expenditures, dividend payments and debt service. We have historically met these requirements by using cash generated from operating activities and borrowings, supplemented by dispositions of assets.

For 2018, we have budgeted capital expenditures of US\$3.744 billion, including US\$972 million for project execution and US\$2.865 billion for sustaining existing operations and replacement projects. A principal amount of US\$1.181 billion of our debt matures in 2018.

We have taken measures to reduce our capital expenditures, and we are constantly evaluating opportunities for additional cash generation. Also, we continue to consider the sale of certain assets and investments, and joint ventures for certain of our businesses. Finally, we are committed to continue the reduction in our costs and expenses, to reduce our debt leverage and to maintain discipline in capital allocation.

## SOURCES OF FUNDS

Our principal sources of funds are operating cash flow and borrowings, supplemented by disposition of assets. The amount of operating cash flow is strongly affected by global prices for our products. In 2017, our operating activities generated cash flows from continuing operations of US\$12.450 billion, compared to US\$6.401 billion in 2016, primarily reflecting the increase in prices of iron ore.

In 2017, we borrowed US\$1.450 billion. Our major transactions in 2017 are summarized below.

- In February 2017, our wholly owned subsidiary Vale Overseas Ltd. issued US\$1.0 billion notes due 2026, guaranteed by Vale S.A. These notes will be consolidated and form a single series with Vale Overseas' US\$1 billion 6.250% notes due 2026 issued in August 2016.
- In 2017, we borrowed US\$450 million in pre-export financing agreements with commercial banks.

In 2017, we received US\$1.221 billion as a result of divestments and sales of interests in certain joint ventures and investments. The main divestment transactions in 2017 are described below:

- In August 2017 and in December 2017, we concluded the sale of a total of four very large ore carriers of 400,000 DWT to Bank of Communications Finance Leasing Co., Ltd. (Bocomm) for which we received US\$356 million. In addition, in January 2017 we received US\$70 million for the sale of two capsized vessels to Polaris Shipping Co. Ltd. for US\$35 million per vessel.
- In March 2017, we received US\$690 million from Mitsui & Co Ltd. associated with the divestment of part of our interest in the Moatize coal mine and in the NLC.

## USES OF FUNDS

In the ordinary course of business, our principal funding requirements are for capital expenditures, dividend payments and debt service.

### Capital expenditures

Our capital expenditures in 2017, excluding the fertilizer business, amounted to US\$3.848 billion, including US\$1.617 billion for project execution and US\$2.231 billion dedicated to sustaining existing operations. For more information about the specific projects for which we have budgeted funds, see *Information on the Company—Capital expenditures*.

### Distributions and repurchases

We paid a second tranche of dividends on the results of the 2016 fiscal year of R\$4.667 billion (classified as interest on shareholders' equity) on April 28, 2017.

On March 15, 2018, we paid dividends on the results of the 2017 fiscal year of R\$4.721 billion (classified as interest on shareholders' equity). We did not repurchase any of our shares in 2017.

### Tax payments

We paid US\$563 million in income tax in 2017, excluding the payments in connection with REFIS, compared to US\$388 million in 2016. In connection with our participation in the REFIS, our outstanding commitment totals US\$5.375 billion, which will be paid in 130 monthly installments. In 2017, we paid a total of US\$488 million in connection with the REFIS.

### Liability Management

In 2017, we repaid US\$7.881 billion in debt. Our main liability management transactions in the year are summarized below.

- The full redemption of Vale Overseas' US\$1.000 billion outstanding 5.625% guaranteed notes due 2019 concurrently with a cash repurchase of US\$501 million of Vale Overseas' outstanding 4.625% guaranteed notes due 2020.
- The full redemption of Vale's €750 million 4.375% notes due in March 2018.
- The repayment of US\$2.930 billion in pre-export payments facilities and US\$1.747 billion in Export Notes with commercial banks.
- The repayment of US\$840 million in loans with development agencies.

On March 14, 2018, we announced the full redemption of Vale Overseas' 4.625% guaranteed notes due 2020 and a cash tender offer for Vale Overseas' 5.875% guaranteed notes due 2021 ("2021 Notes") and 4.375% guaranteed notes due 2022 ("2022 Notes"). On March 22 and March 23, 2018, Vale Overseas repurchased a total of US\$969 million in aggregate principal amount of its 2021 Notes in a cash tender offer. On March 28, 2018, Vale Overseas repurchased US\$781 million in aggregate principal amount of its 2022 Notes in a cash tender offer. Combined, the redemption and tender offers will allow us to repay an aggregate principal amount of US\$2.249 billion in debt.

### DEBT

As of December 31, 2017, our total outstanding debt was US\$22.489 billion (including US\$21.955 billion of principal and US\$533 million of accrued interest) compared with US\$29.322 billion at the end of 2016. As

of December 31, 2017, US\$275 million of our debt was secured by liens on some of our assets. As of December 31, 2017, the weighted average of the remaining term of our debt was 8.9 years, compared to 7.9 years in 2016.

As of December 31, 2017, the short-term debt and the current portion of long-term debt was US\$1.703 billion, including accrued interest.

Our major categories of long-term indebtedness are described below. The principal amounts given below include the current portion of long-term debt and exclude accrued interest.

- *U.S. dollar-denominated loans and financing (US\$4.261 billion as of December 31, 2017).* 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\$12.448 billion as of December 31, 2017).* We have issued in public offerings several series of fixed-rate debt securities, directly by Vale and through our finance subsidiary Vale Overseas Limited, guaranteed by Vale, totaling US\$12.048 billion. Our subsidiary Vale Canada has outstanding fixed rate debt in the amount of US\$400 million.
- *Euro-denominated loans and financing (US\$240 million as of December 31, 2017).* This category includes loans from export credit agencies.
- *Euro-denominated fixed rate notes (US\$900 million as of December 31, 2017).* We have issued in public offering this series of fixed rate debt securities denominated in Euro an amount of €750 million.
- *Other debt (US\$4.106 billion as of December 31, 2017).* We have outstanding debt, principally owed to BNDES, Brazilian commercial banks and infrastructure debentures, denominated in Brazilian *reais* and other currencies.

We have a variety of credit lines available, including the following, as of December 31, 2017:

- A R\$10.050 billion (US\$3.300 billion) financing agreement with BNDES to finance part of the implementation of the S11D project and its infrastructure (CLN S11D). As of December 31, 2017, the total amount available under this facility was R\$1.4 billion (US\$423 million).
- We have two revolving credit facilities with syndicates of international banks, which will mature in 2020 and 2022. In June 2017, we entered into a five-year, US\$2.000 billion syndicated revolving credit facility arranged by a syndicate composed of 18 global banks to replace the five-year, US\$2.000 billion line that we signed in 2013. The revolving credit lines allow more efficient cash management, consistent with our strategic focus on cost of capital reduction. As of December 31, 2017, we had not drawn any amounts under these facilities and the total amount available under these facilities was US\$5.000 billion (with US\$3.000 billion available until 2020), 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 approximately 23% of the aggregate principal amount of our total debt require that we maintain, as of the end of each quarter, (a) a consolidated ratio of total debt to adjusted EBITDA for the



past 12 months not exceeding 4.5 to one and (b) 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, 2017, (i) our consolidated ratio of total debt to adjusted EBITDA for the past 12 months was 1.5 to one and (ii) our consolidated interest coverage ratio was 9.0 to one.

As of December 31, 2017, the corporate guarantees we provided (corresponding to our direct or indirect interest) for the companies Norte Energia S.A. and Companhia Siderúrgica do Pecém S.A. totaled US\$378 million and US\$1.5 billion, respectively.

## CONTRACTUAL OBLIGATIONS

The following table summarizes our contractual obligations as of December 31, 2017. This table excludes other common non-contractual obligations that we may have, including pension obligations, deferred tax liabilities and contingent obligations arising from uncertain tax positions, all of which are discussed in the notes to our consolidated financial statements.

	Payments due by period					
	Total	Less than 1 year	2019	2020	2021	Thereafter
			(US\$ million)			
Debt less accrued interest .....	21,955	1,181	1,750	2,575	2,623	13,826
Interest payments(1) .....	13,085	1,245	1,149	1,090	945	8,656
Operating lease obligations(2) .....	1,053	283	192	179	178	221
Purchase obligations(3) .....	8,263	2,191	1,021	686	604	3,761
<b>Total .....</b>	<b>44,356</b>	<b>4,900</b>	<b>4,112</b>	<b>4,530</b>	<b>4,350</b>	<b>26,464</b>

- (1) Consists of estimated future payments of interest on our loans, financings and debentures, calculated based on interest rates and foreign exchange rates applicable as of December 31, 2017 and assuming that (i) all amortization payments and payments at maturity on our loans, financings and debentures will be made on their scheduled payments dates, and (ii) our perpetual bonds are redeemed on the first permitted redemption date. Amounts do not include derivatives transactions.
- (2) Amounts include fixed payments related to the operating lease contracts for the pellet plants.
- (3) The purchase obligations derive mainly from take-or-pay contracts, contracts for the acquisition of fuel and energy and the acquisition of raw materials and services. For more information, see note 31 to our consolidated financial statements.

## OFF-BALANCE SHEET ARRANGEMENTS

As of December 31, 2017, we did not have any off-balance sheet arrangements as defined in the Form 20-F not disclosed in our consolidated financial statements.

# CRITICAL ACCOUNTING POLICIES AND ESTIMATES

We believe that the following are our critical accounting policies. We consider an accounting policy to be critical if it is important to our financial condition and results of operations and if it requires significant judgments and estimates on the part of our management.

## CONSOLIDATION

In some circumstances, our judgment is to determine whether, after considering all relevant factors, we control, joint control or significant influence over an entity. Significant influence includes situations of collective control. We hold the majority of the voting capital in five joint arrangements (Aliança Geração de Energia S.A., Aliança Norte Energia Participações S.A., Companhia Hispano-Brasileira de Pelotização, Companhia Italo-Brasileira de Pelotização and Companhia Nipo-Brasileira de Pelotização), but our management has concluded that we do not have a sufficiently dominant voting interest to have the power to direct the activities of the entity, as the power to make relevant decisions are shared with other parties, pursuant to the terms of shareholders' agreements. As a result, these entities are accounted under equity method.

## MINERAL RESERVES AND USEFUL LIFE OF MINES

We regularly evaluate and update our estimates of proven and probable mineral reserves. Our proven and probable mineral reserves are determined using generally accepted estimation techniques. Calculating our reserves requires us to make assumptions about future conditions that are uncertain, including future ore and metal prices, currency prices, inflation rates, mining technology, availability of permits, production and capital costs. Changes in some or all of these assumptions could have a significant impact on our recorded proven and probable reserves.

The estimated volume of mineral reserves is used as basis for the calculation of depletion of the mineral properties and also for the estimated useful life, which is a major factor to quantify the provision for asset retirement obligation, environmental recovery of mines and impairment of long-lived assets. Any changes to the estimates of the volume of mine reserves and the useful lives of assets may have a significant impact on the depreciation, depletion and amortization charges and assessments of impairment.

## ASSET RETIREMENT OBLIGATION

Expenditures relating to ongoing compliance with environmental regulations are charged against earnings or capitalized as appropriate. These ongoing programs are designed to minimize the environmental impact of our activities.

We recognize a liability for the fair value of our estimated asset retirement obligations in the period in which they are incurred, if a reasonable estimate can be made. We consider the accounting estimates related to reclamation and closure costs to be critical accounting estimates because:

- we will not incur most of these costs for a number of years, requiring us to make estimates over a long period;
- reclamation and closure laws and regulations could change in the future or circumstances affecting our operations could change, either of which could result in significant changes to our current plans;

- calculating the fair value of our asset retirement obligations requires us to assign probabilities to projected cash flows, to make long-term assumptions about inflation rates, to determine the applicable discount rates that reflect the current market assessments of the time value of the money and the risks specific to the liability; and
- given the significance of these factors in the determination of our estimated environmental and site reclamation costs, changes in any or all of these estimates could have a material impact on net income. In particular, given the long periods over which many of these charges are discounted to present value, changes in our assumptions about credit-adjusted risk-free interest rates could have a significant impact on the size of our provision.

Our executive officers define the policies and procedures that are used to evaluate our asset retirement obligations. The future costs of retirement of our mines and processing assets at all our sites are reviewed annually, in each case considering the actual stage of exhaustion and the projected exhaustion date of each mine and site. The future estimated retirement costs are discounted using applicable discount rates that reflect current market assessments of the time value of money and of the risks specific to the liability.

As of December 31, 2017, we estimated the fair value of our total asset retirement obligations to be US\$3.168 billion.

#### **IMPAIRMENT OF NON-CURRENT ASSETS AND ONEROUS CONTRACTS**

Non-financial assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount might not be recoverable. An impairment loss is recognized for the amount by which the asset's carrying value exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs of disposal ("FVLCD") and value in use ("VIU").

FVLCD is generally determined as the present value of the estimated future cash flows expected to arise from the continued use of the asset, including any expansion prospects, and its eventual disposal. VIU model is determined as the present value of the estimated future cash flows expected to arise from the continued use of the asset in its present form. VIU is determined by applying assumptions specific to the company's continued use and cannot take into account future development. These assumptions are different to those used in calculating fair value and consequently the VIU calculation is likely to give a different result to a FVLCD calculation.

Assets that have an indefinite useful life and are not subject to amortization, such as goodwill, are tested annually for impairment.

For the purposes of assessing impairment, assets are grouped at the lowest levels for which there are separately identifiable cash flows (Cash Generating Units ("CGUs")). Goodwill is allocated to CGUs or CGU groups that are expected to benefit from the business combinations in which the goodwill arose and are identified in accordance with the operating segment.

Non-current assets (excluding goodwill) in which the company recognized impairment in the past are reviewed whenever events or changes in circumstances indicate that the impairment may no longer be applicable. In such cases, an impairment reversal will be recognized.

For onerous contracts, a provision is recognized for the present value of certain long-term contracts where the unavoidable cost of meeting the company's obligations exceed the economic benefits to be received under it.

## **FAIR VALUES OF DERIVATIVES AND OTHER FINANCIAL INSTRUMENTS**

Derivatives transactions that are not qualified for hedge accounting are classified and presented as an economic hedge, as we use derivative instruments to manage our financial risks as a way of hedging against these risks. Derivative financial instruments are recognized as assets or liabilities in the balance sheet and are measured at their fair values. Changes in the fair values of derivatives are recorded in income statement or in stockholders' equity when the transaction is eligible for effective hedge accounting.

We use well-known market participants' valuation methodologies to compute the fair value of instruments. To evaluate the financial instruments, we use estimates and judgments related to present values, taking into account market curves, projected interest rates, exchange rates, counterparty (credit) risk adjustments, forward market prices and their respective volatilities, when applicable. We evaluate the impact of credit risk on financial instruments and derivative transactions, and we enter into transactions with financial institutions that we consider to have a high credit quality. The financial institution's credit risk tracking is performed making use of a credit risk valuation methodology that considers, among other information, published ratings provided by international rating agencies and other management judgments.

## **DEFERRED INCOME TAXES**

We recognize deferred tax effects of tax loss carryforwards and temporary differences in our consolidated financial statements. We record a valuation allowance when we believe that it is probable that tax assets will not be fully recoverable in the future.

Deferred tax assets arising from tax losses, negative social contribution basis and temporary differences are registered taking into consideration the analysis of future performance, based on economic and financial projections, prepared based on internal assumptions and macroeconomic, trade and tax scenarios that may be subject to changes in future.

When we prepare our consolidated financial statements, the provision for income tax is calculated individually for each entity of the Company based on Brazilian tax rates, on an accrual basis, by applying the differential between the nominal local tax rates (based on rules in force in the location of the entity) and the Brazilian rate.

Determining our provision for income taxes and our deferred tax assets and liabilities requires significant management judgment, estimates and assumptions about matters that are highly uncertain. For each income tax asset, we evaluate the likelihood of whether some portion or the entire asset will not be realized. Deferred tax assets recognized in relation to accumulated tax loss carryforwards depends on our assessment of the probability of generation of future taxable profits within the legal entity in which the related deferred tax asset is recorded, based on our production and sales plans, commodity prices, operating costs, environmental costs, group restructuring plans for subsidiaries and site reclamation costs and planned capital costs.

## **LITIGATION**

We disclose material contingent liabilities unless the possibility of any loss arising is considered remote, and we disclose material contingent assets where the inflow of economic benefits is probable. We discuss our material contingencies in note 27 to our consolidated financial statements.

We record an estimated loss from a loss contingency when information available prior to the issuance of our financial statements indicates that it is probable that an outflow of resources will be required to settle an obligation, and the amount of the loss can be reasonably estimated. In particular, given the nature of Brazilian tax legislation, the assessment of potential tax liabilities requires significant management judgment. By their nature, contingencies will only be resolved when one or more future events occurs or fails to occur, and typically those events will occur a number of years in the future. Assessing such liabilities, particularly in the Brazilian legal environment, inherently involves the exercise of significant management judgment and estimates of the outcome of future events.

The provision for litigation as of December 31, 2017, totaling US\$1.473 billion, consists of provisions of US\$582 million for labor, US\$131 million for civil, US\$750 million for tax and US\$10 million for environmental claims. Claims for which the likelihood of loss, in our opinion and based on the advice of our legal counsel, is reasonably possible but not probable, and for which we have not made provisions, amounted to a total of US\$14.605 billion as of December 31, 2017, including claims of US\$1.952 billion for labor claims, US\$1.623 billion for civil claims, US\$8.840 billion for tax claims and US\$2.190 billion for environmental claims.

### **EMPLOYEE POST-RETIREMENT BENEFITS**

We sponsor defined benefit pension and other post-retirement benefit plans covering some of our employees. The determination of the amount of our obligations for these benefits depends on certain actuarial assumptions. These assumptions are described in note 28 to our consolidated financial statements and include, among others, the discount rate, the expected long-term rate of return on plan assets and increases in salaries.

### **PROVISION RELATED TO SAMARCO MINERAÇÃO S.A.**

The provision requires the use of assumptions that may be mainly affected by: (i) changes in scope of work required under the Framework Agreement as result of further technical analysis, (ii) uncertainty regarding the timing of resumption of Samarco's operations; (iii) updates in the discount rate; and (iv) resolution of existing and potential legal claims. As a result, future expenditures may differ from the amounts currently provided and changes to key assumptions could result in a material impact to the amount of the provision in future reporting periods. For each reporting period, we will reassess the key assumptions used by Samarco in the preparation of the projected cash flows and will adjust the provision, if required.

### **DEFERRED REVENUE—GOLD STREAM TRANSACTION**

Defining the gain on sale of mineral interest and the deferred revenue portion of the transaction requires the use of critical accounting estimates as follows: (i) discount rates used to measure the present value of future inflows and outflows; (ii) allocation of costs between nickel or copper and gold based on relative prices; and (iii) expected margin for the independent elements (sale of mineral rights and service for gold extraction) based on our best estimate.

# RISK MANAGEMENT

The purpose of our risk management strategy is to promote enterprise-wide risk management that supports the achievement of our objectives, financial strength and flexibility and business continuity.

We developed an integrated framework for managing risk, which considers the impact on our business of not only market risk factors (market risk), but also 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 political and regulatory conditions in countries in which we operate (political risk), among others.

In order to achieve this objective and to further improve our corporate governance practices, our Board of Directors has established a company-wide risk management policy and a Compliance and Risk Committee. The risk management policy requires that we regularly evaluate and monitor the corporate risks on a consolidated basis in order to guarantee that our overall risk level remains in accordance with our strategic guidelines.

See note 32 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.

## 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:

- *Foreign exchange rates and interest rates.* Our cash flows are 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 *reais* and euros. We may use swaps and forward transactions to convert into U.S. dollars a portion of the cash outflows of these debt instruments.

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. We take advantage of the potential correlation between commodity prices and U.S. dollar floating interest rates as a partial natural hedge for this risk.

- *Product prices and input costs.* We are also exposed to market risks associated with commodities price volatilities. We may enact risk mitigation programs: (i) in situations where



there is a risk of financial distress; (ii) to support commercial activities and specific needs of our business segments; and (iii) to protect from the increase of certain cost items, such as bunker oil and freight chartering. These programs include predominantly forward transactions, futures contracts and options.

## **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 or third party-caused operational catastrophes, regulatory, political, economic or social actions taken by governments or other key stakeholders.

We mitigate operational risk with new controls and improvement of existing ones, new mitigation plans and transfer of risk through insurance. 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.

## **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.

### ***Commercial credit risk management***

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 sales to customers in delinquency.

### ***Treasury credit risk management***

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**

### ***Political exposure***

Under our bylaws, we are prohibited from making, directly or indirectly through third parties, any contribution to political movements in Brazil or abroad, including those organized as political parties, and to their representatives or candidates.

## IV. SHARE OWNERSHIP AND TRADING

### MAJOR SHAREHOLDERS

Our corporate capital is currently composed of 5,284,474,770 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 December 31, 2017.

	Common shares owned	% of class
Litel Participações S.A. ....	1,011,456,740	19.5%
Bradespar S.A.(1) .....	332,965,266	6.4%
Mitsui .....	286,347,055	5.5%
BNDESPAR(2) .....	401,457,757	7.7%
Capital Research and Management Company(3) .....	427,924,638	8.1%
BlackRock, Inc.(4) .....	316,135,263	6.0%
Directors and executive officers as a group .....	608,285	Less than 1%

(1) Bradespar is controlled by a control group consisting of Cidade de Deus—Cia. Comercial Participações, Fundação Bradesco, NCF Participações S.A. and Nova Cidade de Deus Participações S.A.

(2) BNDESPAR is a wholly owned subsidiary of BNDES.

(3) Capital Research and Management Company administers, through its independent investment divisions Capital Research Global Investors, Capital International Investors and Capital World Investors, respectively, 231,673,494 common shares, 148,509,034 common shares and 47,742,110 common shares, corresponding to, respectively, 4.4%, 2.8% and 0.9% of our share capital.

(4) As reported in BlackRock, Inc.'s beneficial ownership report on Schedule 13G, filed with the SEC on February 1, 2018.

The table below sets forth information regarding ownership of Litel Participações S.A. as of December 31, 2017.

	Common shares owned	% of class
<i>Litel Participações S.A. shareholders(1)</i>		
BB Carteira Ativa .....	222,125,666	80.62
Carteira Ativa II FIA .....	31,688,469	11.50
PETROS .....	19,115,854	6.94
Singular FIA .....	2,583,921	0.94
Others .....	439	0.00
Total .....	275,514,349	100.00%

(1) Each of BB Carteira Ativa, Carteira Ativa II and Singular FIA is a Brazilian investment fund. BB Carteira Ativa is 100.00% owned by PREVI. Carteira Ativa II is 100% owned by Funcef. Singular FIA is 100% owned by Fundo de Investimentos em Cotas de Fundo de Investimento em Ações VRD, which in turn is 100% owned by Funcesp. Each of PREVI, Funcef, Petros and Funcesp is a Brazilian pension fund, managing pension plans of employees of Banco do Brasil, Caixa Econômica Federal, Petróleo Brasileiro S.A. and Cia. Energética do Estado de São Paulo, respectively.

### CHANGES IN OUR SHAREHOLDING STRUCTURE

In 2017, we successfully completed a series of measures to simplify our shareholding structure and enhance our corporate governance. These measures are summarized below:

- In August 2017, we concluded a voluntary conversion of our preferred class A shares into common shares (and ADSs representing our preferred class A shares into ADSs representing our common shares) at a fixed exchange ratio based on the volume-weighted average market prices over the last 30 trading sessions on the B3 prior to February 19, 2017. During

the conversion period from June 28 to August 11, 2017, 84.4% of holders of preferred class A shares (and ADSs representing preferred class A shares) chose to convert into common shares, while those that did not elect voluntary conversion remained outstanding at this initial stage.

- In August 2017, shareholders' amendments to our bylaws became effective to provide for:
  - i. at least 20% of our board of directors to be composed of independent directors;
  - ii. mandatory tender offer to all shareholders in case of sale of control;
  - iii. mandatory tender offer in case any shareholder or group of shareholders acquires common shares in an amount equal to or greater than 25% of our total common shares;
  - iv. any disputes between us and our shareholders be resolved by arbitration before the B3 arbitration chamber.
- In October 2017, our shareholders approved the conversion of the 307,140,096 remaining preferred class A shares into common shares at the same ratio applicable to the voluntary conversion of 0.9342 common share for each preferred share. As a result, all remaining preferred class A shares were removed from trading on the B3 as of November 24, 2017 and all ADSs representing preferred class A shares were removed from trading on the NYSE as of November 27, 2017.

In August 2017, we concluded the merger of Valepar into Vale at an exchange ratio that contemplated a 10% increase in the number of shares held by the shareholders of Valepar, and represented a dilution of approximately 3% of the shareholding interest held by the other shareholders of Vale. As a result, we issued 173,543,667 new common shares, all registered and without par value, in favor of Valepar's shareholders (1.2065 of our common shares for each Valepar share held by them). Consequently, Valepar's shareholders own 36.72% of our outstanding common stock after the merger of Valepar. At the time of the merger, Valepar held enough cash and cash equivalents to fully settle its liabilities. The R\$3,073 million goodwill balance carried on Valepar's financial statements was not subject to capitalization in favor of Valepar's shareholders but instead used for the benefit of all of our shareholders.

- On December 22, 2017, we completed our listing on the Novo Mercado segment of B3, the special listing segment of B3 for companies committed to the highest standards of corporate governance;

## SHAREHOLDERS' AGREEMENT

On August 14, 2017, Litel, Bradespar, Mitsui and BNDESPAR executed the Shareholders' Agreement, by means of which they undertake to vote jointly on certain issues. The following are key provisions of the Shareholders' Agreement:

- *Term:* The Shareholders' Agreement will be effective until November 9, 2020.
- *Shares subject to the agreement:* The Shareholders' Agreement will only apply to a portion of the common shares of Vale to be owned by the parties thereto, in a total amount of 20% of Vale's common shares (not including treasury shares). However, in any general shareholders' meeting, common shares owned by the parties to the Shareholders'

Agreement but not subject to the agreement must be voted in accordance with the shares subject to the agreement.

- *Shareholders' prior meetings:* The Shareholders' Agreement does not require meetings thereunder prior to each meeting of the Vale Board of Directors or general shareholders' meeting, unless convened any of the parties to the proposed Vale shareholders' agreement.
- *Qualified quorum matters:* The Shareholders' Agreement requires approval, in a prior meeting, of shareholders holding at least 75% of the shares subject to the agreement owned by the parties in attendance for approval of the following matters, among others:
  - any amendment of Vale's bylaws;
  - any increase or reduction of Vale's capital stock;
  - any issuance of debentures of Vale, whether or not convertible into shares of Vale, call options (*bônus de subscrição*) or any other security of Vale;
  - any amalgamation, spin-off or merger to which Vale is a party, as well as any change to Vale's corporate form;
  - any dissolution, receivership, bankruptcy or any other voluntary act for financial reorganization of Vale or the suspension of any of these proceedings;
  - the removal of any member of Vale's Board of Directors, and the election and removal of any executive officer of Vale;
  - the approval of the aggregate and individual compensation of members of the Board of Directors, Board of Executive Officers, Fiscal Council and advisory committees;
  - creation of companies by Vale, the conversion of currently existing companies into another types of legal entity, the direct or indirect acquisition or disposition of Vale's interests in the capital stock of other companies or entities, including through mergers and spin-offs, as well as the amendment of the corporate documents of these legal entities, whenever the amount involved is equal or greater than 1% of Vale's shareholders' equity, based on Vale's most recent quarterly financial information;
  - the distribution or non-distribution of any dividends (including distributions classified as interest on shareholders' equity) on any shares of capital stock of Vale other than 50% of the net income;
  - the creation of any security interest or guarantee by Vale to any third parties, including companies controlled by or affiliated with Vale, except for subsidiaries of which Vale owns at least 99% of the capital stock;
  - the approval of Vale's maximum limit of indebtedness;
  - the approval of Vale's strategic guidelines and plan, as well as annual and pluriannual budgets and fundraising plan;

## *Major Shareholders*

- any investments or divestments by Vale, as well as any investment agreements, in an amount equal to or greater than 1% of Vale's shareholders' equity, based on Vale's most recent quarterly financial information;
- the approval of any related-party transactions policy;
- the disposal of fixed assets of Vale in an amount exceeding (a) separately, 0.15% of Vale's total assets, or (b) in the aggregate, in a twelve-month period, 0.5% of Vale's total assets, based on Vale's most recent quarterly financial information;
- the cancellation of Vale's listing or the reduction of Vale's listing level on the B3; and
- the appointment and removal by Vale's Board of Executive Officers of the chief executive officer in subsidiaries, companies affiliated with Vale or other companies in which Vale is entitled to appoint the chief executive officer.

## RELATED PARTY TRANSACTIONS

We have a policy on related party transactions, which 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. The definition of related party is based on applicable accounting standards and on this internal policy, which may be more restrictive than applicable laws and regulations under certain circumstances. Pursuant to that policy and our bylaws, our Compliance and Risk 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. Under the policy, 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. The policy also prohibits the extension of any loans to related parties other than our subsidiaries and affiliated companies. For information regarding investments in associate companies and joint ventures and for information regarding transactions with major related parties, see notes 15 and 30 of our consolidated financial statements.

We have engaged, and expect to continue to engage, in arm's-length transactions with certain entities controlled by, or affiliated with, our principal shareholders, including the following:

### **BRADESCO**

Bradespar is controlled by a group of entities that also control Banco Bradesco S.A. ("Bradesco"). Bradesco and its affiliates are full-service financial institutions that 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. An affiliate of Bradesco owns preferred shares representing 36.4% of the total capital of our subsidiary MBR.

### **BANCO DO BRASIL**

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 the majority of the common equity of Litel Participações S.A., which in turn holds 19.5% of the common shares of Vale. 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.

### **MITSUI**

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. Mitsui has an indirect stake in Vale Mozambique and Nacala Corridor Holding, which controls the coal operations (mine, rail and port) in Mozambique (see *Information on the Company—Business overview—Significant changes in our business*).

## **BNDES**

BNDES is the Brazilian state-owned development bank and the parent company of one of our major shareholders, BNDESPAR. Below is a description of our main transactions with BNDES:

We and BNDES are parties to a contract relating to authorizations for mining exploration. This contract, which we refer to as the Mineral Risk Contract, provides for the joint development of certain unexplored mineral deposits that form part of our Northern System, except for our iron ore and manganese ore deposits which were specifically excluded from the contract, as well as proportional participation in any profits earned from the development of such resources. In 2007, the Mineral Risk Contract was extended indefinitely, with specific rules for all exploration projects and exploration targets and mineral rights covered under the contract.

BNDES has provided us with credit lines of R\$3.9 billion (US\$1.2 billion) financing for our CLN 150 Mtpy project and a R\$6.2 billion (US\$1.9 billion) financing for our S11D project and its infrastructure (CLN S11D). For more information on our transactions with BNDES, see *Operating and financial review and prospects—Liquidity and capital resources*.

BNDES holds a total of R\$1.104 billion (US\$334 million), in debentures of our subsidiary Salobo Metais S.A., with a right to subscribe for Salobo's preferred shares in exchange for part of the outstanding debentures, which right expires two years after Salobo reaches an accumulated revenue equivalent to 200,000 tons of copper.

BNDES holds debentures issued by Vale exchangeable into common shares of VLI.

BNDESPAR is in the control group of several Brazilian companies with which we have commercial relationships in the ordinary course of our business.

## DISTRIBUTIONS

Our current dividend policy was approved by shareholders at the shareholders' meeting held on March 29, 2018. Distributions may be classified as "dividends" or "interest on shareholders' equity," for Brazilian tax purposes, and references to "dividends" should be understood to cover all distributions, regardless of their classification, unless otherwise stated.

Pursuant to our dividend policy, dividends will be paid in two installments: the first in September of each year and the second in March of the following year. The minimum amount of dividends is determined as 30% of the difference between Adjusted EBITDA and capital investments dedicated to sustaining existing operations, calculated based on the first semester results for the first installment and on the second semester results for the second installment. The Board of Directors may declare interest on shareholders' equity in December of each year, for payment in March of the following year, in which case the amount of the second installment of dividends would be reduced by the amount distributed as interest on shareholders' equity. The Board of Directors may also choose to provide additional remuneration to shareholders via distribution of extraordinary dividends.

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*.

The tax regime applicable to distributions to ADR and to non-resident shareholders 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 depositary. The custodian then converts such proceeds into U.S. dollars and transfers such U.S. dollars to be delivered to the depositary for distribution to holders of ADRs net of the depositary's fees. For information on taxation of dividend distributions, see *Additional information—Taxation—Brazilian tax considerations*.



## Distributions

The following table sets forth the cash distributions we paid to holders of common shares and preferred shares for the periods 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 per share(1)	U.S. dollars total(1) (US\$ million)
		Dividends	Interest on equity	Total		
2013 .....	April 30	0.15	0.71	0.86	0.44	2,250
	October 31	0.12	0.82	0.94	0.44	2,250
2014 .....	April 30	–	0.90	0.90	0.41	2,100
	October 31	0.34	0.65	0.99	0.41	2,100
2015 .....	April 30	–	0.60	0.60	0.19	1,000
	October 31	0.37	–	0.37	0.10	500
2016 .....	December 16	–	0.17	0.17	0.05	250
2017 .....	April 28	–	0.91	0.91	0.28(2)	1,470(2)
2018 .....	March 15	–	0.91	0.91	0.28(2)	1,451(2)

(1) As approved by the Board of Directors.

(2) Calculated based on the exchange rate for the US dollar (Ptax-Option 5) published by the Central Bank of Brazil (BCB), on the day prior to payment.

## 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 New York Stock Exchange ("NYSE"), under the ticker symbol VALE. Our common ADSs are traded on Euronext Paris under the ticker symbol VALE3. Citibank N.A. serves as the depositary for both the common ADSs. On February 28, 2018, there were 1,291,791,211 common ADSs outstanding, representing 24.85% of our total share capital.

## SHARE PRICE HISTORY

The following table sets forth trading information for our ADSs, as reported by the New York Stock Exchange and our shares, as reported by the B3, for the periods indicated. Share prices in the table have been adjusted to reflect stock splits.

	B3 (Reais per share)				NYSE (US\$ per share)			
	Common share		Preferred share		Common ADS		Preferred ADS	
	High	Low	High	Low	High	Low	High	Low
2013 .....	44.10	28.39	42.60	26.00	21.49	12.63	20.88	11.47
2014 .....	35.71	18.69	32.73	16.00	15.25	6.86	14.01	5.89
2015								
1Q .....	22.84	17.94	20.10	15.45	8.69	5.65	7.63	4.85
2Q .....	27.06	17.54	20.30	14.95	8.80	5.58	6.66	4.77
3Q .....	19.94	15.35	16.00	12.27	5.90	4.03	5.00	3.21
4Q .....	20.79	11.65	16.26	9.32	5.48	3.07	4.31	2.43
2016								
1Q .....	17.58	8.60	12.78	6.57	4.65	2.15	3.42	1.60
2Q .....	21.76	14.02	16.68	11.24	6.07	3.91	4.66	3.02
3Q .....	19.12	16.02	16.17	12.78	6.07	4.82	5.05	3.79
4Q .....	31.03	17.65	27.84	15.55	9.16	5.45	8.20	4.78
2017								
1Q .....	36.43	25.06	34.24	22.85	11.52	7.99	10.87	7.36
2Q .....	30.65	25.35	28.97	24.06	9.86	7.77	9.33	7.26
3Q .....	36.10	28.50	33.25	26.71	11.64	8.74	10.79	8.17
4Q .....	40.24	31.10	33.36	28.61	10.50	9.77	9.73	9.07
Last six months								
November 2017(1) .....	36.25	32.16	33.36	29.93	11.33	9.77	10.24	9.11
December 2017 .....	40.24	35.30	–	–	12.23	10.74	–	–
January 2018 .....	43.50	40.87	–	–	13.53	12.70	–	–
February 2018 .....	47.40	40.35	–	–	14.65	12.36	–	–
March 2018 .....	44.45	40.86	–	–	13.58	12.23	–	–
April 2018 (until April 11, 2018)	44.84	42.55	–	–	13.14	12.50	–	–

(1) Preferred class A shares were removed from trading on November 24, 2017.

## 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.

Depositary service	Fee payable by ADR holders
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 (v) 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 programs 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

## *Depository Shares*

expenses and fees payable to service providers for the distribution of material to ADR holders. The depository also agreed to make an additional reimbursement annually based on the issuance and cancellation fees, dividend fees and depository service fees charged by the depository to our ADS holders. In this context, for the year ended December 31, 2017, Citibank N.A. reimbursed us US\$9.7 million.

## PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

Vale did not engage in any share repurchase program during 2017.

## 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. Our bylaws provide for a Board of Directors consisting of 12 members and 12 alternates, each of whom serves on behalf of a particular director. Our bylaws provide that the chief executive officer cannot serve as chairman of the Board of Directors.

The Board of Directors holds regularly scheduled meetings on a monthly basis and holds additional meetings when called by the chairman, vice-chairman or any two directors. Decisions of the Board of Directors require a quorum of a majority of the directors and are taken by majority vote. Alternate directors may attend and vote at meetings in the absence of the director for whom the alternate director is acting.

All members (and their respective alternates) are elected for the same two-year term at a general shareholders' meeting, can be re-elected, and are subject to removal at any time. The terms of all of our directors and alternate directors will expire at the Ordinary General Shareholder's meeting of 2019.

Nine of our twelve current directors (and eight of our nine alternate directors) were appointed by the parties to the Shareholders' Agreement. One director and his respective alternate are appointed by our employees, pursuant to our bylaws. Non-controlling shareholders holding common shares representing at least 15% of our voting capital have the right to appoint one member and an alternate to our Board of Directors.

Pursuant to the Novo Mercado listing rules and our bylaws, at least 20% of our directors must be independent. To be considered independent under our bylaws and the Novo Mercado listing rules in effect in 2017, a director may not (i) have current professional ties to Vale other than as a member of the Board of Directors or be a significant shareholder of Vale; (ii) have been an employee or executive of Vale or of any party to the Shareholders' Agreement for at least the past three years; (iii) sell goods or services to or purchase goods or services from Vale; (iv) be affiliated with any party to the Shareholders' Agreement; (v) be a relative, to the second degree, of any director or executive of Vale; (vi) have been a member of Vale's audit committee in the past three years; and (vii) be an affiliate of any non-profit organization receiving significant financial resources from Vale. New listing rules applicable to independence requirements were approved for the Novo Mercado in September 2017 and came into force in January 2018.

The following table lists the current members of the Board of Directors and each director's alternate.

Director	Year first elected	Alternate director	Year first elected
Gueitiro Matsuo Genso (chairman)	2015	Gilberto Antonio Vieira	2015
Fernando Jorge Buso Gomes (vice-chairman)	2015	Moacir Nachbar Junior	2015
Oscar Augusto de Camargo Filho	2003	Eduardo de Oliveira Rodrigues Filho	2011
Dan Antônio Marinho Conrado	2012	Arthur Prado Silva	2015
Marcel Juviniانو Barros	2012	Gilmar Dalilo Cezar Wanderley	2017
Lucio Azevedo(1)	2015	Raimundo Nonato Alves Amorim(1)	2017
Eduardo Refinetti Guardia	2016	Robson Rocha	2011
Toshiya Asahi	2017	Yoshitomo Nishimitsu	2015
Denise Pauli Pavarina	2017	Luiz Mauricio Leuzinger	2012
Sandra Guerra(2)(3)	2017	Vacant	-
Isabella Saboya(3)	2017	Vacant	-
Ney Roberto Ottoni de Brito	2018	Vacant	-

(1) Appointed by our employees.

(2) Ms. Guerra was elected in a separate election by non-controlling shareholders.

(3) Independent directors under Novo Mercado listing rules applicable in 2017.

Below is a summary of the business experience, activities and areas of expertise of our current directors.

**Gueitiro Matsuo Genso**, 46: Chairman of Vale's Board of Directors since February 2016 (Member of Vale's Board of Directors since March 2015); Member of the Personnel Committee since November 2017.

*Other current director or officer positions:* Chief Executive Officer of PREVI—Caixa de Previdência dos Funcionários do Banco do Brasil S.A. since 2015.

*Professional experience:* Member of Vale's Executive Development Committee from April 2017 to October 2017 and of Vale's Strategic Committee from 2015 to 2017; Chief Executive Officer of Valepar from 2015 to August 2017; Executive Officer of Private Customers of Banco do Brasil S.A. from 2014 to 2015; Member of the Board of Directors of the Brazilian Interbank Payment Chamber from 2014 to 2015; Member of the Fiscal Council of Grupo Segurador BB Mapfre from 2011 to 2015; Sector Officer of the Brazilian Bank Federation (Febraban) from 2010 to 2015; Executive Officer of Real Estate Credit of Banco do Brasil S.A. from 2011 to 2014; Executive Officer of Home Loans of Banco do Brasil S.A. from 2011 to 2014; Executive Officer of Loans of Banco do Brasil S.A. from 2010 to 2011; and Executive Officer of Products of Banco Nossa Caixa S.A. from 2009 to 2010.

*Academic background:* Degree in business administration from Faculdade SPEI; MBA from Fundação Getúlio Vargas; and MBA in agribusiness from Escola Superior de Agricultura Luiz de Queiroz.

**Fernando Jorge Buso Gomes**, 61: Vice Chairman of Vale's Board of Directors since January 2017 (Member of Vale's Board of Directors since April 2015); Member of the Finance Committee since April 2015, Coordinator of the Sustainability Committee and Member of the Personnel Committee since November 2017.

*Other current director or officer positions:* Chief Executive Officer and Investor Relations Executive Officer of Bradespar since 2016 and 2015, respectively; Member of the Board of Directors of 2b Capital S.A. since 2014; and Executive Officer of Millennium Security Holdings Corp. since 2015.

*Professional experience:* Coordinator of Vale's Governance Sustainability Committee and Member of the Executive Development Committee from April 2015 to October 2017; Executive Officer of Valepar from 2015 to 2017; Member of the Board of Directors of Valepar from 2015 to 2017 (and Vice-Chairman of Board of Directors from January to August 2017); Member of the Board of Directors of Sete Brasil S.A. from 2011 to 2015; Chairman of the Board of Directors of Smartia Corretora de Seguros S.A. from 2012 to 2015; Chairman of the Board of Directors of SMR Grupo de Investimentos e Participações S.A. from 2014 to 2015; Member of the Board of Directors of BCPAR S.A. from 2013 to 2015; Member of the Board of Directors of BR Towers S.A. from 2013 to 2014; Member of the Board of Directors of CPFL Energias Renováveis S.A. from 2011 to 2012; and Member of the Board of Directors of LOG Commercial Properties S.A. from 2013 to 2015; Executive Officer of Banco Bradesco BBI S.A. from 2006 to 2015.

*Academic background:* Degree in economic sciences from Faculdades Integradas Bennett.

**Oscar Augusto de Camargo Filho**, 80: Member of Vale's Board of Directors since October 2003 and Coordinator of the Personnel Committee since November 2017.

*Other current director or officer positions:* Managing Partner of CWH Consultoria Empresarial, since 2003.



*Professional experience:* Member of the Board of Directors of Valepar from 2003 to 2014; Member of Vale's Strategy Committee from March 2006 to October 2017; and Coordinator of Vale's Executive Development Committee from November 2003 to October 2017.

*Academic background:* Degree in law from Universidade de São Paulo; and Post-graduate degree in international marketing from Cambridge University.

**Dan Antonio Marinho Conrado, 53:** Member of Vale's Board of Directors since October 2012; Member of the Sustainability Committee since November 2017.

*Professional experience:* Member of Vale's Governance and Sustainability Committee from April 2017 to October 2017 and of Vale's Strategic Committee from October 2012 to April 2015; Chairman of Vale's Board of Directors from October 2012 to February 2016; Chairman of Valepar's Board of Directors from 2012 to 2017; Chief Executive Officer of Valepar from 2012 to 2015; Chief Executive Officer of PREVI—Caixa de Previdência dos Funcionários do Banco do Brasil S.A. from 2012 to 2014, Alternate Member of the Board of Directors of Mapfre BB SH2 Participações S.A. from 2011 to 2017; Alternate Member of the Board of Directors of Petróleo Brasileiro S.A.—Petrobrás and, Member of the Board of Directors of its wholly owned subsidiary, BR Distribuidora, from July 2015 to November 2015; Member of the Board of Directors of Fras-le S.A. from 2010 to 2013; Member of the Board of Directors of Aliança do Brasil S.A. from 2010 to 2011; and Vice-President of Retail, Distribution and Operations of Banco do Brasil S.A. from 2011 to 2012.

*Academic background:* Degree in law from Universidade Dom Bosco; MBA from Universidade Federal do Rio de Janeiro, COPPEAD; and MBA from Instituto de Ensino e Pesquisa em Administração of Universidade Federal de Mato Grosso, Inepad.

**Marcel Juvinião Barros, 55:** Member of Vale's Board of Directors since October 2012; Member of the Personnel Committee since November 2017.

*Other current director or officer positions:* Officer of Securities of PREVI—Caixa de Previdência dos Funcionários do Banco do Brasil S.A. since 2012; and Member of the Board of PRI—Principles for Responsible Investment of the UN since 2015.

*Professional experience:* Member of the Executive Development Committee of Vale from February 2013 to October 2017; Member of the Board of Directors of Valepar from 2012 to August 2017; held several positions at Banco do Brasil S.A., including Union Auditor, between 1987 and 2012; and General Secretary of the National Confederation of Financial Branch Workers from 2008 to 2011.

*Academic background:* Degree in history from Fundação Municipal de Ensino Superior de Bragança Paulista.

**Lucio Azevedo, 59:** Member of Vale's Board of Directors since April 2015.

*Professional experience:* Chairman of Railway Labor Unions in the Brazilian states of Maranhão, Pará and Tocantins since 2013.

*Academic background:* Incomplete secondary education.

**Eduardo Refinetti Guardia, 52:** Member of Vale's Board of Directors since July 2016; Member of the Finance Committee since April 2017 and Coordinator of the Finance Committee since August 2017.

*Other current director or officer positions:* Executive Secretary of the Department of the Treasury since 2016; and Manager of the Capital and Risk Committee of Banco do Brasil S.A. since September 2017.

*Professional experience:* Executive Officer of Products of BM&FBOVESPA (now B3) from 2013 to 2016; Executive Officer of Finance and Investor Relations of BM&FBOVESPA (now B3) from 2010 to 2013; and Chairman of the Board of Directors of Banco do Brasil S.A. from June 2016 to April 2017.

*Academic background:* Degree in economics from Pontifícia Universidade Católica; Master's Degree in economics from Universidade Estadual de Campinas; and PhD in economics from Universidade de São Paulo.

**Ney Roberto Ottoni de Brito, 72:** Member of Vale's Board of Directors since January 2018; Coordinator of the Compliance and Risk Committee and Member of the Finance Committee since January 2018.

*Other current director or officer positions:* Chief Executive Officer of Ney O. Brito e Associados since 1978.

*Academic background:* Graduate degree in mechanical engineering from Escola Politécnica of the Universidade Federal do Rio de Janeiro; Master's degree in production engineering from COPPE of the Universidade Federal do Rio de Janeiro; PhD in finance from Stanford University.

**Toshiya Asahi, 51:** Member of Vale's Board of Directors since October 2017.

*Other current director or officer positions:* Vice President of Mitsui & Co. (Brasil) S.A. since 2015; and Member of the Board of Directors of Gaspetro since October 2016.

*Professional experience:* Deputy General Manager of New Metals and Aluminum of Mitsui & Co. Ltd. from 2014 to 2015; Deputy Executive Officer of Mitsui & Co. Ltd. from 2012 to 2014.

*Academic background:* Graduate degree in metallurgical engineering from the University of Kyushu.

**Denise Pauli Pavarina, 54:** Member of Vale's Board of Directors since February 2017; Member of the Sustainability Committee since November 2017.

*Other current director or officer positions:* Member of the Sustainability Committee of Banco Bradesco S.A. since March 2017; Member of the Conduct and Ethics Committee of Banco Bradesco S.A. since 2016; Member of the IT Committee of BM&FBOVESPA S.A.—Bolsa de Valores, Mercadorias e Futuro (now B3) since 2016; Member of the Board of Directors of B3 since 2015; Member of the Advisory Committee for Intermediation Sector of B3 since 2015; Managing Director of BRAM—Bradesco Asset Management S.A. since 2012; Member of the Management Board of Fundação Bradesco since 2009; Member of the Board of Directors of Fundação Instituto de Moléstias do Aparelho Digestivo e da Nutrição since 2012; Member of the Board of Directors (representing ANBIMA) of Instituto BRAIN—Brasil Investimentos & Negócios since 2012; Managing Director of Kirton Bank S.A. and Kirton Gestão de Recursos Ltda. since 2016; Member of the Investment Committee of NEO Capital Mezanino Fundo de Investimentos em Participações since 2010; and Vice-Chairman of the Board of Directors of 2bCapital S.A. since 2014.

*Professional experience:* Member of the Board of Directors of Valepar from March 2017 to August 2017; Member of Vale's Governance and Sustainability Committee from April 2017 to October 2017; Adjunct Executive Officer of Banco Bradesco S.A. from 2012 to 2015; Managing Executive Officer of Banco Bradesco S.A. from 2015 to 2017; Member of the Management Board of Fundação Bradesco from 2001 to

2007; President of Associação Brasileira das Entidades dos Mercados Financeiros e de Capitais—ANBIMA from 2012 to 2016; Superintendent Director of BRAM—Bradesco Asset Management S.A. from 2009 to 2012; Member of the Representatives Council (representing ANBIMA) of Confederação Nacional das Instituições Financeiras—CNF from 2012 to 2016; Member of the Consulting Board of Instituto BRAIN—Brasil Investimentos & Negócios from 2012 to 2014; Member of the Strategic Committee (representing ANBIMA) of Instituto BRAIN—Brasil Investimentos & Negócios from 2012 to 2013; and Member of the Board of Directors of 2bCapital S.A. from 2010 to 2014.

*Academic background:* Degree in economic sciences from Faculdade Armando Álvares Penteado; Law degree from Universidade Paulista; MBA from Institute de Ensino e Pesquisa; and Advanced Management Program from IESE Business School.

**Sandra Maria Guerra de Azevedo, 62:** Member of Vale's Board of Directors since October 2017 and Member of the Compliance and Risk Committee since November 2017.

*Other current director or officer positions:* Founding Partner of Better Governance Consulting Services since 2005; Member of the Board of Directors of Vix Logística S.A. since 2015; Member of the Board of Directors of Global Reporting Initiative since January 2017.

*Professional experience:* Member of the Board of Directors of Companhia Paranaense de Energia from October 2016 to April 2017; Consulting counselor of Solvi Participações from 2011 to 2013; Consulting counselor of Solvi Valorização Energética from January 2013 to June 2013; Consulting counselor of Solvi Saneamento from June 2012 to December 2012; Consulting counselor of Grupo Itapemirim from 2009 to 2013; and Co-founder of the Brazilian Institute of Corporate Governance (IBGC), serving as Chairman of its Board of Directors from 2012 to 2016.

*Academic background:* Graduate degree in social communications-journalism from Universidade Paulista; MBA from Universidade de São Paulo.

**Isabella Saboya, 47:** Member of Vale's Board of Directors since October 2017

*Other current director or officer positions:* Member of the Board of Directors of Wiz Soluções e Corretagem de Seguros S.A. since April 2016; Vice-chairman of the Board of Directors of the Brazilian Institute of Corporate Governance (IBGC) since April 2017; Member of the State Governance Market Advisory Chamber of B3 since August 2017; Member of the Council of Autoregulation in Investment Governance Abrapp/Sindapp/ICSS since December 2016.

*Professional experience:* Member of the Fiscal Council of Bradespar S.A. from April 2016 to July 2016; Member of the Fiscal Council of Mills S.A. from April 2016 to April 2017; Member of the Board of Directors of BR Malls S.A. from May 2016 to March 2017; Partner at Jardim Botânico Investimentos S.A. from 2009 to 2015.

*Academic background:* Graduate degree in economics from Pontifícia Universidade Católica do Rio de Janeiro.

## 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:

- The *Personnel Committee*, which is responsible for (i) evaluating Vale's general human resources policies as submitted by the executive officers to the Board of Directors; (ii) evaluating the adequacy of the compensation model for members of the Board of Executive Officers and the proposed annual, global budget for the compensation of executives; (iii) aiding the Board of Directors in the setting and monitoring of goals for the performance evaluation of the Board of Executive Officers and other executives who report directly to the Chief Executive Officer; (iv) aiding the Board of Directors in the setting and monitoring of goals for the performance evaluation of those in charge of Vale's Governance Office, Internal Auditing and Ombudsman; (v) supporting the Board of Directors in the process of selecting and appointing the Chief Executive Officer, as well as evaluating the appointment, by the latter, of the other members of the Executive Board and other leaders who report directly to the Chief Executive Officer; (vi) monitoring the development of the succession plan for the Executive Board and other leaders who report directly to the Chief Executive Officer, as well as their successors, and proposing improvements; (vii) evaluating and recommending adjustments to corporate governance best practices concerning the structure, size and composition of the Board of Directors and the Advisory Committees, as well as the balance of experiences, knowledge and diversity of the profiles of their members; (viii) identifying and recommending potential candidates to be directors and also potential candidates to be members of the Advisory Committees; (ix) supporting the Chairman of the Board of Directors in organizing the process for performance evaluation of Vale's Board of Directors and Advisory Committees; (x) preparing and approving the Personnel Committee's annual work plan; and (xi) proposing analysis and evaluation, as well as opining about other topics under its responsibility.
- The *Finance Committee*, which is responsible for (i) evaluating the structure and conditions of investment and divestment transactions, including mergers, consolidations and spin-offs in which Vale is involved; (ii) evaluating the compatibility between the compensation level of shareholders and the parameters established in the annual budget and financial scheduling, as well as their consistency with the general policy on dividends and Vale's capital structure; (iii) evaluating Vale's policies on minimum cash and financial investments; (iv) evaluating Vale's annual budget and annual investment plan; (v) evaluating Vale's annual funding plan and indebtedness limits; (vi) evaluating current and capital investments, which are the responsibility of the Board of Directors; (vii) monitoring the financial execution of capital expenditure projects, ongoing budget and cash flow; (viii) monitoring financial risks and controls in light of the integrated risk map, as well as proposing improvements to risk mitigation plans; (ix) evaluating Vale's policy for communications with the capital markets; (x) preparing and approving the Finance Committee's annual work plan; and (xi) proposing financial analyses and evaluations, as well as opining about other topics under its responsibility.
- The *Compliance and Risk Committee*, which is responsible for (i) monitoring that Vale has the structure, processes, practices, mechanisms and systems, among others, in place to ensure compliance with all applicable legal and regulatory requirements; (ii) ensuring Vale's adoption and improvement of compliance best practices and integrity, including evaluating potential conflicts of interest; (iii) ensuring the effectiveness and compliance of Vale's policies and normative documents with the legal and regulatory requirements applicable to its business and activities; (iv) monitoring the suitability, strength and performance of all of

Vale's internal control systems and proposing improvements; (v) monitoring the scope of activities and effectiveness of the departments in charge of Vale's corporate governance, compliance, corporate integrity, risk management and controls and proposing improvements; (vi) supporting the Board of Directors in setting risk exposure limits; (vii) evaluating procedures adopted concerning the effectiveness of processes and controls to identify, assess, monitor and manage risk; (viii) monitoring Vale's integrated risk map, as well as proposing improvements in risk mitigation plans; (ix) ensuring the effectiveness of mechanisms to handle conflicts of interests in Vale's transactions, as well as opining on related-party transactions submitted to the Board of Directors pursuant to the Policy on Transactions with Related Parties; (x) evaluating proposals for modifying the corporate governance documents, such as the By-Laws, the Code of Ethics and Conduct and Internal Rules of Vale's Advisory Committees and Board of Directors, in addition to other Policies and documents which are not the responsibility of other Committees; (xi) promoting, monitoring and ensuring the development and efficacy of the Vale's governance model, assuring that all initiatives are in line with the best practices and are in synergy; (xii) evaluating and monitoring updates related to current norms, regulations and recommendations, in addition to practices and market trends that may impact Vale's activities; (xiii) preparing and approving an annual work plan of the Committee; and (xiv) proposing analysis and evaluation, as well as opining about other topics under its responsibility.

- The *Sustainability Committee*, which is responsible for (i) evaluating Vale's sustainability strategy, and ensuring that it is considered when setting overall strategy; (ii) evaluating Vale's policies and conduct related to Safety, the Environment, Health, Social Actions, Communication and Institutional Relations; (iii) evaluating Vale's performance regarding sustainability aspects and proposing improvements based on a long-term vision; (iv) aiding in setting, evaluating and monitoring the company's sustainability indicators and proposing improvements; (v) evaluating and proposing Vale's adherence to national or international initiatives or agreements related to socio-environmental responsibility matters, and monitoring the preparation and disclosure of the sustainability report; (vi) monitoring the scope of operations and effectiveness in the department of institutional relations in dealing with regulatory entities and other institutional relationships associated with sustainability topics; (vii) evaluating policies and proposals for donations, as well as non-obligatory expenses related to item (ii) above, which are the responsibility of the Board of Directors; (viii) monitoring all operational risks and controls from the perspective of the integrated risk map, including risks to safety, the environment, health and social actions and reputational risks, as well as proposing improvements in risk mitigation plans; (ix) preparing and approving the Sustainability Committee's annual work plan; and (x) proposing analysis and evaluation of topics under its responsibility.

## 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, executive officers must be Brazilian residents.

The Board of Directors appoints executive officers for two-year terms and may remove them at any time. The following table lists our current executive officers.

Officer	Year of appointment	Position	Age
Fabio Schwartsman .....	2017	Chief Executive Officer	64
Luciano Siani Pires .....	2012	Chief Financial Officer and Executive Officer for Investor Relations	48
Gerd Peter Poppinga(1) .....	2014	Executive Officer (Ferrous Minerals and Coal)	58
Eduardo de Salles Bartolomeo .....	2017	Executive Officer (Base Metals)	53
Luiz Eduardo Frões do Amaral Osorio .....	2017	Executive Officer (Sustainability and Institutional Relations)	43
Alexandre Gomes Pereira .....	2017	Executive Officer (Business Support)	48

(1) Gerd Peter Poppinga was Executive Officer for Base Metals Operations and Information Technology of Vale from November 2011 to November 2014 and Executive Officer for Ferrous Minerals of Vale from November 2014 to May 2017.

Below is a summary of the business experience, activities and areas of expertise of our current executive officers.

**Fabio Schwartsman, 64:** Chief Executive Officer of Vale since May 2017 and Member of the Information Disclosure Committee since May 2017.

*Professional experience:* Coordinator of Vale’s Strategic Committee from May 2017 to October 2017; Chief Executive Officer of Klabin S.A. from 2011 to 2017; Chief Executive Officer of SanAntonio Internacional from April 2008 to April 2010; Chief Executive Officer of Telemar Participações S.A. from April 2007 to February 2008; several executive positions at Grupo Ultra from May 1985 to April 2007, including Planning and Control Officer and Investor Relations Officer, Chief Financial Officer of Ultrapar Holding and managing partner of Ultra S.A.; and General Manager of the Economic Studies, Development and Planning areas of Duratex S.A. from February 1976 to April 1985.

*Academic background:* Graduate and post-graduate degrees in production engineering from the University of São Paulo and a post-graduate degree in Business Administration from Fundação Getúlio Vargas.

**Luciano Siani Pires, 48:** Chief Financial Officer and Executive Officer for Investor Relations of Vale since August 2012 and Member of the Disclosure Committee and of the Executive Risk Management Committee since August 2012.

*Professional experience:* Alternate Member of the Board of Directors of Vale, from 2005 to 2007; Member of Vale’s Financial Committee from 2012 to 2015; Global Officer of Strategic Planning, from 2008 to 2009 and in 2011, and Global Officer of Human Resources and Governance from 2009 to 2011 of Vale; Member of the Board of Directors of Valepar, from 2007 to 2008; Member of the Board of Directors of Telemar Participações S.A., from 2005 to 2008; Member of the Board of Directors of Suzano Papel e Celulose S.A., from 2005 to 2008; Several executive positions at BNDES, including executive secretary and chief of staff of the presidency, Head of capital markets and export finance, from 1992 to 1999 and from 2001 to 2008, respectively; and Consultant at McKinsey & Company from 2003 to 2005.

*Academic background:* Degree in mechanical engineering from Pontifícia Universidade Católica do Rio de Janeiro; and MBA in finance from the Stern School of Business, New York University.

**Gerd Peter Poppinga, 58:** Executive Officer for Ferrous Minerals and Coal of Vale since July 2017.



*Other current director or officer positions:* Member of the Board of Directors of Vale International since June 2015.

*Professional experience:* Executive Officer for Ferrous Mineral of Vale from November 2014 to June 2017; Executive Officer for Base Metals Operations and Information Technology of Vale from November 2011 to November 2014; Executive vice president for Asia Pacific of Vale Canada from November 2009 to November 2011; Director for strategy, business development, human resources and sustainability of Vale Canada from May 2008 to October 2009; Director for strategy and information technology of Vale Canada from November 2007 to April 2008; Several memberships on boards of directors and executive boards from 2005 to 2010 in connection with his roles at Vale; and Several positions at Mineração da Trindade S.A.—SAMITRI, a publicly held mining company acquired by Vale in 2001, from 1985 to 1999.

*Academic Background:* Degree in geology from Universität Clausthal—Zellerfeld, Germany; Participated in coursework in geostatistics at Universidade Federal de Ouro Preto (UFOP), executive MBA at Fundação Dom Cabral, negotiation dynamics at INSEAD; senior leadership at the Massachusetts Institute of Technology and IMD Business School in Lausanne, Switzerland, and strategic megatrends (Asia-focused) at Kellogg Singapore.

**Eduardo de Salles Bartolomeo, 53:** Executive Officer for Base Metals of Vale since January 2018.

*Other current director or officer positions:* Chairman of the Board of Directors of Login Logística Intermodal since 2016.

*Professional experience:* Member of Vale's Board of Directors from September 2016 to December 2017; Coordinator of Vale's Compliance and Risk Committee from November 2017 to December 2017; Member of Vale's Financial Committee from April to December 2017; Chief Executive Officer of Nova Transportadora do Sudeste from April to December 2017; Member of Vale's Strategic Committee from September 2016 to October 2017; Executive Officer of Vale for Integrated Operations from 2010 to 2012; Executive Officer of Vale for Logistics, Projects & Sustainability from 2007 to 2010; Member of the Board of Directors of Arteris S.A. from 2015 to 2017; Chief Executive Officer of BHG – Brazilian Hospitality Group from 2013 to 2015; Member of the Board of Directors of MRS Logística S.A. from 2007 to 2009; Head of Vale's logistical operations from 2004 to 2006; and Chief Executive Officer of Petroflex from 2006 to 2007.

*Academic background:* Graduate degree in metallurgical engineering from Universidade Federal Fluminense; MBAs from Katholieke Universiteit Leuven and the Massachusetts Institute of Technology.

**Luiz Eduardo Frões do Amaral Osorio, 43:** Executive Officer for Sustainability and Institutional Relations of Vale since July 2017.

*Other current director or officer positions:* President of the Board of Directors of Instituto Brasileiro de Mineração – IBRAM.

*Professional experience:* Executive Vice-President of Legal and Company Relations of CPFL Energia S.A. from 2014 to 2017; Member of the Board of Directors of CPFL Energias Renováveis S.A. from 2014 to 2017; Vice-Chairman of the Board of Directors of Instituto CPFL from 2015 to 2017; Executive Director of International Markets of Raízen from 2012 to 2014; Vice President, General Counsel and Chief Institutional Relations Officer of CPFL Energy Group from May 2014 to July 2017; Executive Director for International Markets, based in London, of Raízen from July 2012 to March 2014; Vice President for Sustainable Development and External Affairs of Raízen from March 2011 to June 2012.

*Academic background:* Law degree from Pontifícia Universidade Católica do Rio de Janeiro; Master's degree in development management from American University's School of International Service; Participated in coursework in corporate social responsibility at Harvard Business School, general management skills at INSEAD, strategy and leadership at the University of Pennsylvania and leadership in corporate counsel from Harvard Law School.

**Alexandre Gomes Pereira, 48:** Executive Officer for Business Support since August 2017.

*Professional experience:* Global Information Officer of Vale from 2011 to 2017; Head of Global IT Services of Vale from 2009 to 2011; Vice President and Chief Information Officer of Vale's global nickel business (Vale Canada) from 2007 to 2009; IT General Manager of Vale from 2002 to 2007.

*Academic background:* Degree in mathematics/computer science from State University of Rio de Janeiro (UERJ); Post-graduate degrees in business management from Fundação Dom Cabral and in computer networks from the Federal University of Espírito Santo (UFES); and MBA from São Paulo University (USP).

## CONFLICTS OF INTEREST

Under Brazilian corporate law, 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. Under our Policy on Related Party Transactions, 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. For more details about our Policy on Related Party Transactions see *Share ownership and trading—Related party transactions*.

## 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 monitor management's activities, review the company's financial statements, and report its findings to the shareholders. Our management is required to obtain the Fiscal Council's pre-approval before engaging independent auditors to provide any audit or permitted non-audit services to Vale or its consolidated subsidiaries. Our Fiscal Council has pre-approved a detailed list of services based on detailed proposals from our auditors up to specified monetary limits. The list of pre-approved services is updated from time to time. Services that are included in this list, or that exceed the specified limits, or that relate to internal controls must be separately approved by the Fiscal Council. The policy also sets forth a list of prohibited services. The Fiscal Council is provided with reports on engagement and performance of the services included in the list on a periodic basis, and it also reviews and monitors the company's external auditor's independence and objectivity. The Fiscal Council has the power to review and evaluate the performance of the company's external auditors on an annual basis and make a recommendation to the Board of Directors on whether the company should remove and replace its existing external auditors. The Fiscal Council may also recommend withholding the payment of compensation to the independent auditors and has the power to mediate disagreements between management and the auditors regarding financial reporting.

Under our bylaws and internal regulations, our Fiscal Council is also responsible for evaluating the effectiveness of the procedures for the receipt, retention and treatment of any complaints related to



accounting, controls and audit issues, as well as procedures for the confidential, anonymous submission of concerns regarding such matters.

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.

We are subject to Rule 10A-3 under the Exchange Act, which requires, absent an exemption, that a listed company maintains a standing audit committee composed of members of the Board of Directors that meet specified requirements. In lieu of establishing an independent audit committee, we have given our Fiscal Council the necessary powers to qualify for the exemption set forth in Exchange Act Rule 10A-3(c)(3). We believe our Fiscal Council satisfies the independence and other requirements of Exchange Act Rule 10A-3 that would apply in the absence of our reliance on the exemption.

Our Board of Directors has determined that one of the members of our Fiscal Council, Mr. Marcus Vinicius Dias Severini, is an audit committee financial expert. In addition, Mr. Marcus Vinicius Dias Severini meets the applicable independence requirements for Fiscal Council membership under Brazilian law and the NYSE independence requirements that would apply to audit committee members in the absence of our reliance on the exemption set forth in Exchange Act Rule 10A-3(c)(3).

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 20, 2017. The terms of the members of the Fiscal Council expire at the next annual shareholders' meeting following election.

Two members of our Fiscal Council (and the respective alternates) may be elected by non-controlling shareholders: one member may be appointed by the holders of our golden shares and one member may be appointed by minority holders of common shares pursuant to applicable CVM rules.

The following table lists the current and alternate members of the Fiscal Council.

<u>Current member</u>	<u>Year first elected</u>	<u>Alternate</u>	<u>Year first elected</u>
Robert Juenemann(1) .....	2017	Gaspar Carreira Junior(1) .....	2017
Raphael Manhães Martins(2) .....	2015	Bernardo Zito Porto(2) .....	2017
Marcelo Amaral Moraes(3) .....	2004	Vacant(4) .....	-
Marcus Vinicius Dias Severini(3) .....	2017	Vacant(5) .....	-
Eduardo Cesar Pasa(3) .....	2017	Sergio Mamede Rosa do Nascimento(3) ....	2016

- (1) Appointed the shareholders of golden shares.
- (2) Appointed by minority shareholders of common shares.
- (3) Appointed by Valepar.
- (4) Vacant since the General Ordinary Shareholders' meeting of 2014.
- (5) Vacant since the General Ordinary Shareholders' meeting of 2017.

Below is a summary of the business experience, activities and areas of expertise of the members of our Fiscal Council.

**Robert Juenemann, 52:** Member of Vale's Fiscal Council since April 2017.

*Other current director or officer positions:* Founding partner of Robert Juenemann Advocacia Empresarial e Familiar since 1999; Member of the Board of Directors and Audit Committee of the Brazilian Institute of Corporate Governance (IBGC) since 2014; Managing Partner of Arrow Governança e Marketing Ltda since 2011.

*Professional experience:* Member of the IBGC's review group on Codes for Better Corporate Governance Practices from 2014 to 2015; Member of the Fiscal Council of Centrais Elétricas de Santa Catarina S.A. during 2013; Member of the Fiscal Council of Eternit during 2015; Member of the Fiscal Council of Centrais Elétricas Brasileiras S.A. (Eletrobras) from 2013 to 2016; Member of the International Ethics Standards Board for Accountants of the International Federation of Accountants (IFAC).

*Academic background:* Law degree and post-graduate degree in civil process from the Pontificia Universidade Católica do Rio Grande do Sul; Post-graduate degree in strategic planning from Escola Superior de Propaganda e Marketing; and Certification as a conflict mediator by the Center for Effective Dispute Resolution in London since 2011.

**Raphael Manhães Martins, 35:** Member of Vale's Fiscal Council since April 2015.

*Other current director or officer positions:* Member of the Board of Directors of Eternit S.A. since 2015; Member of the Fiscal Council of Light S.A. since 2014; Attorney for Faoro Advogados since 2010; Member of the Board of Directors of Condor S.A. Indústria Química since May 2017; and Member of the Board of Directors of Welser Itage Participações e Comércio S.A. since May 2017.

*Professional experience:* Attorney for Cr2 Empreendimentos from 2007 to 2009.

*Academic background:* Degree in law from Universidade Estadual do Rio de Janeiro.

**Marcelo Amaral Moraes, 50:** Member of Vale's Fiscal Council since April 2004.

*Other current director or officer positions:* President of the Fiscal Council of Aceco TI S.A. since 2016; Member of the Board of Directors of Eternit S.A. since 2016; and Member of the Board of Directors of CPFL Energia S.A. since April 2017.

*Professional experience:* Managing Director of Capital Dynamics Investimentos Ltda. from 2012 to 2015.

*Academic background:* Degree in economics from Universidade Federal do Rio de Janeiro; MBA from COPPEAD at the Universidade Federal do Rio de Janeiro; and Post-graduate Degree in corporate law and arbitration from Fundação Getúlio Vargas.

**Marcus Vinícius Dias Severini, 60:** Member of Vale's Fiscal Council since April 2017.

*Other current director or officer positions:* Member of the Fiscal Council of BRF S.A. since 2015 and Member of the Fiscal Council of Mills Estruturas e Serviços de Engenharia S.A. since 2015.

*Professional experience:* Controller from 1994 to 2015.

*Academic background:* Degree in accounting sciences from UniverCidade; Graduate degree in electrical engineering from Universidade Federal Fluminense; and a specialized degree in economic engineering from UniSUAW.

**Eduardo Cesar Pasa, 47:** Member of Vale's Fiscal Council since April 2017.

*Other current director or officer positions:* Accounting Management Officer of Banco do Brasil S.A. since April 2015; Member of the Deliberations Council of PREVI since 2010; Member of the Fiscal Council of Petrobras S.A. since April 2017 .

*Professional experience:* Coordinator of Vale's Controlling Committee of Vale from 2014 to 2017; Member of the Fiscal Council of Centrais Elétricas Brasileiras S.A. (Eletrobras) from 2015 to 2017; Member of the Fiscal Council of Cateno Gestão de Contas de Pagamento S.A. from 2016 to 2017; General Accounting Manager of Banco do Brasil S.A. from 2009 to 2015; Member of the Fiscal Council of CASSI from 2010 to 2014; Alternate Member of the Fiscal Council of Banco Votorantim S.A. from 2009 to 2015; and Member of the Fiscal Council of BBTS-BB Tecnologia e Serviços from 2008 to 2015.

*Academic background:* Graduate degree in accounting sciences from Centro Universitário de Brasília – UniCeub; Post-graduate degree in accounting sciences from the Post-Graduate School of Economics at Fundação Getúlio Vargas; Master's Degree in accounting sciences from the School of Economics, Administration and Accounting of the Universidade de São Paulo.

# MANAGEMENT COMPENSATION

Under our bylaws, our shareholders are responsible for establishing the aggregate compensation we pay to the members of our Board of Directors and our Board of Executive Officers, and the Board of Directors allocates the compensation among its members and the Board of Executive Officers. The Personnel Committee, composed of four members of the Board of Directors and one independent non-director, advises the Board of Directors on the distribution of the annual aggregate compensation among the directors and executive officers and in setting and monitoring goals for the performance evaluation of the Executive Board. See *Management and employees—Management—Advisory committees to the Board of Directors*.

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 submitted by our Board of Directors for approval of our shareholders, and the distribution of the aggregate compensation among the members of our Board of Directors and our Board of Executive Officers, are based on benchmarking against the compensation policies and practices of the top global mining companies and other large global companies in other 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.

One of the core principles for designing the compensation proposal is the alignment with our performance and return to our shareholders. For 2018, the aggregate compensation for our Board of Executive Officers is expected, assuming that we achieve average performance among our peer group, to be composed as follows: 27% fixed compensation, 27% short-term (performance target-based) variable compensation and 46% long-term (share-based incentives) variable compensation. The short-term variable compensation component is based on our cash generation, taking into account economic and financial targets that reflect operating performance, as well as health and safety targets, sustainability and accomplishment of strategic initiatives. Of the long-term variable portion, 20% of aggregate compensation is to be awarded under our Matching Program and 26% is to be awarded as Performance Shares Units (PSUs) under our phantom stock plan, for which payment is a direct function of our Total Shareholder Return (TSR) indicator's performance compared to a preselected group of comparable companies.

## EXECUTIVE OFFICERS

For the year ended December 31, 2017, the total expenditures related to executive officers' compensation packages, including compensation accrued for the year and payable at a later date, is set forth in the table below.

	<b>For the year ended December 31, 2017</b>
	(US\$ million)
Fixed compensation and in-kind benefits .....	7.60
Variable compensation .....	13.24
Pension, retirement or similar benefits .....	1.53
Total paid to 2017 executive officers .....	22.37
Severance .....	20.19
Total paid to 2017 and former executive officers .....	42.56
Social security contributions .....	8.03
Total expenditures related to executive officers' compensation packages .....	50.59

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, life insurance, driver and car expenses. Variable compensation consists of (i) an annual cash bonus, based on specific targets for each executive officer, approved by our Board of Directors, and (ii) payments tied to the performance of our shares under two programs, the Matching Program and the Performance Shares Units (PSU). Vale has also entered into indemnification agreements with its officers.

Under our Matching Program, our executive officers are permitted to purchase a certain number of common 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 equivalent to the same number of common shares or ADRs held through the end of the cycle. Participants may sell or transfers their common shares or ADRs at any time during the vesting period, in which case they forfeit the right to receive any reward with respect to these common shares or ADRs. Participation in our Matching Program is mandatory for our Board of Executive Officers in the years in which we pay cash bonuses.

Under our PSU program, our executive officers receive payments in cash tied to Vale's performance, as compared to a selected group of peer companies, based on the total return (dividend payments and share appreciation) of the common shares of those companies in a four-year cycle.

Pension, retirement or similar benefits consist of our contribution to Valia, the manager of pension plans sponsored by Vale.

Our severance packages for qualified terminations may comprise: (i) a lump-sum severance payment, corresponding to one-half the annual fixed compensation for executive officers and equal to the annual fixed compensation for the Chief Executive Officer, paid shortly after the termination date; (ii) non-compete agreement compensation corresponding to twice the annual fixed compensation, to be paid in eight equal quarterly installments after termination; (iii) pro-rated payment of any outstanding long-term variable compensation grants (PSU and Matching programs), paid shortly after the termination date; and (iv) pro-rated payment of any outstanding short-term incentive plan (bonus), to be paid in April following the termination date. Severance expenditures in 2017 were related to five former executive officers who left the company in 2016 and 2017.

Social security contributions are mandatory contributions we are required to make to the Brazilian government for our executive officers.

## **BOARD OF DIRECTORS**

In 2017, we paid US\$2.11 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. On February 28, 2018, the total number of common shares owned by our directors and executive officers was 635,523. None of our directors or executive officers beneficially owns 1% or more of any class of our shares. Vale has also entered into indemnification agreements with its directors.

## **FISCAL COUNCIL**

We paid an aggregate of US\$0.61 million to members of the Fiscal Council in 2017. In addition, the members of the Fiscal Council are reimbursed for travel expenses related to the performance of their functions.

**ADVISORY COMMITTEES**

We paid an aggregate of US\$0.24 million to members of our advisory committees in 2017. Under our bylaws, those members who are directors or officers of Vale are not entitled to additional compensation for participating on a committee. Members of our advisory committees are reimbursed for travel expenses related to the performance of their duties.

# EMPLOYEES

The following tables set forth the number of our employees by business and by location as of the dates indicated.

	As of December 31,		
	2015	2016	2017(1)
<b>By business:</b>			
Ferrous minerals.....	42,838	42,579	42,734
Coal .....	1,608	2,039	2,258
Base metals .....	15,554	15,239	15,243
Fertilizer nutrients(1) .....	9,181	8,935	8,055
Corporate activities .....	4,917	4,270	5,306
Total .....	74,098	73,062	73,596

(1) Discontinued operations.

	As of December 31,		
	2015	2016	2017(1)
<b>By location:</b>			
South America.....	58,830	57,535	58,457
North America.....	6,773	6,630	6,432
Europe .....	385	385	375
Asia .....	4,516	4,499	4,571
Oceania .....	1,654	1,521	1,364
Africa .....	1,940	2,492	2,397
Total .....	74,098	73,062	73,596

(1) Since January 2017, we include all fixed-term contract employees and trainees in our total workforce figures, as well as 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 Australia, Brazil, Canada, Indonesia, Malawi, Mozambique, New Caledonia, Oman, Peru and the United Kingdom.

## WAGES AND BENEFITS

Wages and benefits for Vale and its subsidiaries are generally established on a company-by-company basis. We establish our wage and benefits programs for Vale S.A. and its subsidiaries, other than Vale Canada. In November 2017, we reached a one-year agreement with the Brazilian unions providing for a salary increase of 2.5% beginning in November 2017. 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 March 2017, Vale Canada reached a four-year agreement with the union representing technical and administrative employees at the Sudbury operation. For non-unionized employees, Vale Canada undertakes an annual review of salaries and benefits. We also provide our employees and their dependents with other benefits, including supplementary medical assistance, and in 2017 Vale Canada introduced a new Flexible Benefits plan for its non-union employees.

## 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.

Employees within our Base Metals operations, principally in Canada and the United Kingdom, participate in defined benefit pension plans and defined contribution pension plans. All new employees within our Base Metals operations participate in defined contribution pension plans. Employees in Japan and Taiwan participate in a defined benefit pension plan. Employees in other jurisdictions, including China, Indonesia, Malawi, Switzerland and the United States, 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 programs. See description of these programs under *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, social security and labor proceedings. The most significant proceedings are discussed below. Except as otherwise noted below, the amounts claimed, and the amounts of our provisions for possible losses, are stated as of December 31, 2017. See note 27 to our consolidated financial statements for further information.

#### LEGAL PROCEEDINGS RELATED TO THE FAILURE OF SAMARCO'S TAILINGS DAM IN MINAS GERAIS

We are engaged in several legal proceedings relating to the failure of Samarco's tailings dam in the city of Mariana, in the state of Minas Gerais. Most of these proceedings are in early stages, and we cannot reasonably estimate the possible loss or range of loss or the timing for a decision. Other proceedings or investigations relating to the failure of Samarco's tailings dam are expected.

##### *a) Public civil action filed by the Brazilian government and others*

In November 2015, the Brazilian federal government, the states of Minas Gerais and Espírito Santo, certain federal and state authorities and certain public entities collectively filed a public civil action before the 12<sup>th</sup> Federal Court in Belo Horizonte, state of Minas Gerais, against Samarco and its shareholders, Vale and BHPB. The plaintiffs claimed approximately R\$20.2 billion in monetary damages and a number of measures to remediate the environmental damages caused by the Fundão dam failure. Certain claims brought by the plaintiffs refer to specific defendants individually, while other claims are directed at all defendants.

In December 2015, the federal court in Minas Gerais granted an injunction preventing Vale from selling or otherwise transferring its mining rights in Brazil. In November 2016, the federal court ordered that the defendants: (i) in 90 days, present evidence that the leakage of waste from Fundão tailing dam has been definitely contained; (ii) in six months, present conclusive studies, with the endorsement from the appropriate environmental agencies, regarding an action plan and the feasibility of the removal of mud deposited on the banks of Rio Doce river, its tributaries and the areas near its estuary; (iii) in 30 days, make a deposit in the total amount of R\$1.2 billion to secure future reparation measures. This proceeding is currently suspended as a result of the Framework Agreement and the preliminary agreements with the MPF described under item b) below. We submitted to the court documentation to comply with items (i) and (ii) above, but the court has not ruled on the sufficiency of these documents. The court has provisionally suspended our obligation to make the R\$1.2 billion cash deposit to the extent that we provide the guarantees required under the preliminary agreements with the MPF.

In March 2016, we, together with Samarco and BHPB, entered into the Framework Agreement with the federal government, the state governments of Espírito Santo and Minas Gerais and certain other federal and state authorities. In January 2017, Samarco, Vale and BHPB entered into two preliminary agreements with the MPF as described below. We expect the Framework Agreement and the agreements with the MPF to be a first step towards the settlement of these actions. Any settlement of these actions is subject to approval by the court.

### ***b) Public civil action filed by the Federal Prosecution Office***

In May 2016, the MPF filed a public civil action before the 12<sup>th</sup> Federal Court in Belo Horizonte against Samarco, Vale, BHPB, BNDES and the governmental authorities that are parties to the Framework Agreement. In July 2016, the court excluded all the governmental authorities and BNDES as defendants in this proceeding. In this action, the MPF requested that the court order a broad range of specific actions to be taken by the various parties. The MPF also stated in its complaint that the required remedial measures would have a total value of R\$155 billion, based on a comparison with the costs of the Deepwater Horizon oil spill in the Gulf of Mexico in 2010.

In this public civil action, the MPF claims monetary damages from the defendants on a joint and several basis as well as other forms of relief, including injunctions (i) ordering the defendants to implement several measures to mitigate or remediate social, economic and environmental impacts arising from the collapse of the Fundão dam, as well as other emergency measures; (ii) preventing the defendants from encumbering or disposing of their assets; (iii) preventing the defendants from paying dividends; (iv) ordering the defendants to deposit R\$7.7 billion into a fund, managed by the defendants, for implementation of social, environmental and emergency programs; (v) ordering the defendants to provide collateral in the amount of R\$155 billion to secure their compliance with the final court decision; (vi) ordering the defendants to maintain working capital in the amount of R\$2 billion initially, and thereafter in an amount equal to 100% of the expenses of the remediation and compensation measures projected for the subsequent twelve months; and (vii) ordering BNDES to take actions under its credit agreements with the defendants, including cessation of further drawings and acceleration of outstanding principal. A preliminary hearing for conciliation was held in September 2016.

In January 2017, Samarco, Vale and BHPB entered into two preliminary agreements with the MPF in connection with this public civil action and the public civil action brought by the Brazilian government and others.

The first preliminary agreement consists of an initial transitory agreement, which will be effective until the parties agree on the terms of a comprehensive agreement, and provides for (i) a process and timetable for the resolution of the public civil action brought by the Brazilian government and others and the public civil action brought by the MPF; (ii) the appointment of experts selected by the MPF to review and monitor the remediation programs provided under the Framework Agreement; (iii) the holding of public hearings in different communities in the states of Minas Gerais and Espírito Santo and in the territories of the Krenak, Tupiniquim and Guarani indigenous people; and (iv) the obligation of Samarco, Vale and BHPB to provide collateral to secure the payment of the socio-environmental and socio-economic remediation measures, in the amount of R\$2.2 billion. The required collateral will consist of R\$100 million in financial investments, R\$1.3 billion in insurance bonds and R\$800 million in assets of Samarco. On November 20, 2017, the court accepted a joint request by Samarco, Vale, BHPB and the MPF to extend the negotiation period of the comprehensive agreement until April 20, 2018.

The second preliminary agreement provides for a timetable to make funds available for remediation measures in the municipalities of Barra Longa, Rio Doce, Santa Cruz do Escalvado and Ponte Nova, in the total amount of R\$200 million.

Both preliminary agreements were ratified by the 12th federal court in Belo Horizonte, state of Minas Gerais, in 2017.

We expect the Framework Agreement and the preliminary agreements to be a first step towards the settlement of the public civil action brought by the Brazilian government and others, the public civil action brought by MPF and other related proceedings.

### ***c) Criminal proceeding***

In October 2016, the MPF filed criminal charges before the federal court of Ponte Nova, state of Minas Gerais, against Samarco, Vale, BHPB and a number of individuals who were employees of Samarco or members of Samarco's governance bodies or advisory committees. The charges include murder, physical injury and various environmental crimes due to the failure of Samarco's Fundão dam.

The criminal charges were accepted by the judge in November 2016, which initiated the criminal proceeding. We submitted our initial defense in March 2017 and the parties are now in the evidence-gathering phase. We are not able to anticipate when a judgement will be issued or when a trial relating to the murder charges will commence.

### ***d) Class actions in the United States***

We and certain of our officers have been named as defendants in civil class action suits in federal courts in New York brought by holders of our securities and by holders of Samarco's bonds, each under U.S. federal securities laws. The plaintiffs allege that we made false and misleading statements or omitted to make disclosures concerning the risks of the operations of Samarco's Fundão dam and the adequacy of the related programs and procedures. The plaintiffs have not specified an amount of alleged damages in these actions.

We believe that the claims have no merit, and we will continue contesting them. However, given the preliminary status of the actions, it is not possible to determine a range of outcomes or reliable estimates of the potential exposure at this time, and no provision has been recognized so far.

#### ***d.1) Related to Vale's American Depositary Receipts***

Vale and certain of its officers were named as defendants in a securities class action in the U.S. Federal Court for the Southern District of New York brought by holders of Vale's ADRs under U.S. federal securities laws.

In March 2017, the Judge issued a ruling dismissing a significant part of the claims against us and the individual defendants, and allowing the case to continue based on more limited claims. The claims that were not dismissed relate to certain statements contained in our 2013 and 2014 sustainability reports concerning risk mitigation plans, policies and procedures, and certain statements made in a conference call in November 2015 concerning our responsibility for the Fundão dam collapse. This lawsuit is currently in the discovery phase.

#### ***d.2) Related to the Samarco's bonds***

Vale, together with Samarco and BHPB, was named as defendant in class action alleging violations of U.S. federal securities laws brought by holders of bonds issued by Samarco in the U.S. Federal Court for the Southern District of New York. The defendants filed a joint motion to dismiss the complaint, and a decision on this motion is still pending. Discovery will not commence until after the court rules on the defendants' pending motion.

### ***e) Other proceedings***

Vale is a defendant in several public civil actions brought by state prosecutors of Minas Gerais and Espírito Santo, other authorities or civil associations claiming environmental damages as a result of the failure of

Samarco's dam. The relief claimed in these proceedings are generally similar to the claims brought in the public civil action brought by the Brazilian government and others and the public civil action brought by the MPF. In 2017, The Superior Court of Justice (STJ) decided that the 12<sup>th</sup> Federal Court in Belo Horizonte is the competent court to rule on all these public civil actions. All these public civil actions have been suspended while we negotiate an agreement with the MPF, as discussed in item b) above.

Vale has 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 Fundão dam failure. These proceedings include requests for significant amounts in damages, injunctions, pre-judgment attachment of assets and seizure of our bank accounts. Vale has settled part of these suits, and continues to defend itself in a number of these proceedings.

Samarco is engaged in several other investigations and proceedings claiming damages resulting from the dam failure. Immediately after the dam failure, the environmental authority of the state of Minas Gerais and the DNPM (currently, ANM) commenced an investigation into the causes of the dam failure, and ordered the suspension of Samarco's operations pending the conclusion of these investigations.

## **TUBARÃO PORT LITIGATION**

In January 2016, as part of an environmental investigation conducted by the Brazilian federal police, a federal court in the Brazilian state of Espírito Santo ordered the suspension of our activities in Pier II and the coal pier of the Tubarão Port, due to potential environmental damages resulting from the release of iron ore in the sea area around Pier II and the coal pier. Our operations in Pier II and the coal pier of the Tubarão Port were suspended for four days, until the Federal Court of Appeals ("TRF") of the Second Region (*Tribunal Regional Federal da Segunda Região*) suspended the effects of the injunction. In July 2016, the TRF confirmed the suspension of the effects of the injunction and ordered an expert investigation to confirm that we had properly implemented measures to monitor, control and mitigate the release of iron ore in the terminal. This expert investigation has not started yet. As part of this proceeding, we may be required to implement additional measures to prevent or mitigate the release of iron ore in the sea.

In September 2017, the federal police concluded its environmental investigation, and recommended that the MPF press charges against us for environmental crimes resulting from the release of iron ore in the sea around the Tubarão port. We cannot anticipate whether the MPF will follow the federal police's recommendation or whether the MPF will seek other actions against us, including actions that may result in further suspension of our activities in the Tubarão port. We will vigorously contest any action against us resulting from the conclusions of the federal police's investigation.

## **ONÇA PUMA LITIGATION**

In 2009, the MPF brought a public civil action against Vale and the Brazilian state of Pará, seeking the suspension of our nickel operations in Onça Puma, in the state of Pará, due to the alleged impact on the Xikrin do Cateté and Kayapó indigenous communities located close to the mining site. The federal prosecutor contends that (i) our operations would be contaminating the water of the Catete River, which crosses the communities, (ii) we have failed to comply with certain conditions under our environmental licenses, and (iii) the state of Pará should not have granted environmental license to this operation.

In September 2017, the TRF of the First Region (*Tribunal Regional Federal da Primeira Região*) granted an injunction suspending certain of our nickel mining operations at Onça Puma and ordering us to make a

monthly payment to each member of the Xikrin and Kayapó tribes to compensate the affected indigenous communities. Our mining activities in Onça Puma has been suspended since September 2017. We have appealed this decision to seek a suspension of this injunction, but a decision on our appeal is still pending and we cannot anticipate when our mining activities in Onça Puma will resume. We believe that the MPF's claims have no merit, and will continue to vigorously contest this action.

## **PUBLIC CIVIL ACTION SEEKING SUSPENSION OF S11D PROJECT**

In May 2016, associations representing the indigenous community of Xikrin do Cateté brought a public civil action against Vale, the Federal Environmental Agency (IBAMA), the Federal Indigenous Agency (FUNAI) and the National Bank of Economic and Social Development (BNDES), seeking the suspension of the environmental permitting process of our S11D project. 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 project have not provided the required consent. The plaintiffs also requested a monthly payment of R\$2 million for each association until the defendants conclude the studies.

Applicable law provides for mandatory consultation with the indigenous communities located within ten kilometers of the project, and these indigenous communities are located more than 12 kilometers away from the project. We have submitted our preliminary defense, and in January 2017 the court denied plaintiffs' request for an injunction suspending our S11D project.

In July 2017, the judge of the Federal Court of Marabá partially modified the previous decision and ordered that we prepare a study of the impacts of the S11D operation on the Xikrin tribe within 180 days. This decision does not affect our operations in S11D. We appealed this decision and will continue to vigorously contest this action.

## **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, 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\$4.702 billion. An expert report favorable to Vale has been issued, but the court granted the municipality's request for additional expert evidence. The elaboration of this additional expert evidence is pending.

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\$5.440 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.

## **ENVIRONMENTAL PROCEEDINGS INVOLVING JANGADA AND FEIJÃO MINES**

In June 2016, the environmental authority of the Brazilian state of Minas Gerais ordered the suspension of part of our Jangada and Feijão mines in the Southern System, in order to protect caves located near these mines, under Brazilian legislation for the protection of caves. We obtained an injunction from the state

courts of Minas Gerais suspending the order of the environmental authority. On an appeal by the environmental authority, the court ordered that we post a bond of R\$83 thousand to secure the payment of a fine imposed in the notice of infringement, but did not revert the decision suspending the order of the environmental authority. The main proceedings are still ongoing. In the event that the injunction is overturned or revoked, we may be required to suspend approximately 50% of our operations at the affected mines, with potential consequences for production volumes, costs or reserves in our iron ore business. Our total production in the Jangada and Feijão mines was 49 thousand metric tons and 7.8 million metric tons, respectively, in 2017.

### **ENVIRONMENTAL PROCEEDINGS INVOLVING TAILINGS DAM “MARAVILHAS III”**

In October 2017, the Public Prosecutor’s Office of the State of Minas Gerais filed a lawsuit against us challenging the environmental licenses granted by the environmental authority of the State of Minas Gerais for the construction of the Maravilhas III tailings dam. The court of Minas Gerais granted a preliminary injunction suspending the project, but later revoked this preliminary injunction, after we presented technical arguments against the request originally made by the Public Prosecutor’s Office, therefore allowing the project to continue. The Public Prosecutor’s Office appealed the decision, which is currently in queue to be reviewed by the Court of Appeals. The Maravilhas III tailings dam will support our operations in the Vargem Grande mining complex, in our Southern System. If the construction of this dam is interrupted, our operations in the mining complex of Vargem Grande could be adversely impacted.

### **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 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 made findings against us. We submitted our defense at the administrative level, which was rejected. In April 2016, we commenced judicial proceedings challenging the administrative findings, and the labor court in May 2016 issued an order preventing the Ministry of Labor from including our name in the list of entities engaging in practices similar to slavery.

### **RAILWAY LITIGATION**

In 1994, prior to our privatization, we entered into a contract with Rede Ferroviária Federal S.A. (“RFFSA”), the Brazilian federal rail network, to build two railway networks in Belo Horizonte, Brazil, which were to be incorporated into an existing railway segment, in a project called “Transposição de Belo Horizonte.” We subsequently entered into a related agreement with the Brazilian government to begin the construction of an alternative railway segment, because the initially agreed segments could not be built. In August 2006, RFFSA (now succeeded as defendant by the Brazilian government) filed a breach of contract claim against us stemming from the 1994 contract regarding the construction of two railway networks.

Before the RFFSA lawsuit was filed, we had filed a claim against RFFSA challenging the inflation adjustment provisions in the contract with RFFSA. We contend that the method of calculation employed by the Brazilian government is not lawful under Brazilian law. Pursuant to a partial settlement of the original RFFSA lawsuit, if the claim is decided in the Brazilian government’s favor, then the construction

costs of the new railway segment assumed by Vale will offset the damages due from Vale under such claim, representing a significant reduction in the amount we would be required to pay.

In June 2012, the federal judge rejected both RFFSA's claims and our contractual claim for review of the inflation adjustment provisions. On February 24, 2016, the Federal Court of Appeals (Tribunal Regional Federal) affirmed the June 2012 decision of the federal judge. An RFFSA request for clarification and special and extraordinary appeals by RFFSA were each denied by the Federal Court of Appeals. On January 8, 2018, RFFSA filed appeals to the Federal Supreme Court (STF) and to the Superior Court of Justice (STJ). Our appeal is still pending before the STJ in the lawsuit brought by Vale against RFFSA. The current amount claimed by RFFSA, including adjustments for inflation and interest, is approximately of R\$4.5 billion. Our appeal is still pending before the STJ in the lawsuit brought by Vale against RFFSA.

## **PRAIA MOLE SUIT**

We are among the defendants in a public civil action filed by the MPF in November 1997 seeking to annul the concession agreements under which the defendants operate the Praia Mole maritime terminal in the Brazilian state of Espírito Santo. In July 2012, the Federal Court of Appeals affirmed the November 2007 decision that rejected MPF's claim and recognized the validity of those concession agreements. The MPF has appealed that ruling, and a final decision on the appeal is still pending.

## **CITIZEN SUIT AGAINST THE CONVERSION OF PREFERRED SHARES INTO COMMON SHARES**

We are a defendant on a citizen suit (*ação popular*) brought by certain officers of FUNCEF (Caixa Econômica Federal's pension fund) and oil sector workers challenging (i) the conversion of preferred class A shares into common shares; (ii) any actions to terminate the current controlling shareholder group; (iii) Valepar's merger into Vale; and (iv) all other resolutions and approvals that took place at the extraordinary shareholders' meeting held on June 27, 2017. These plaintiffs allege that the new corporate structure and Vale's migration to the *Novo Mercado* segment would result in damages and losses to the Brazilian Federal Government and its controlled entities, and request annulment of the extraordinary shareholders' meeting held on June 27, 2017 in its entirety. In August 2017, the federal court in Brasilia rejected the preliminary injunction requested by the plaintiffs.

We submitted our defense in January 2018. We believe that the claims have no merit, and we will vigorously contest this action.

## **TAX PROCEEDINGS**

### ***a) CFEM-related proceedings***

We are engaged in numerous administrative and judicial proceedings related to the mining royalty known as the CFEM. For more information about CFEM, see *Information on the Company—Regulatory matters—Royalties and other taxes on mining activities*. These proceedings arise out of a large number of assessments by the DNPM. The proceedings concern different interpretations of DNPM's method of estimating sales, the statute of limitations, due process of law, payment of royalties on pellet sales and CFEM charges on the revenues generated by our subsidiaries abroad. The aggregate amount claimed in the pending assessments is approximately R\$7.3 billion, including interest and penalties through December 31, 2017.

We are contesting DNPM's claims using the available avenues under Brazilian law, beginning with challenges in administrative tribunals and proceeding with challenges in the judicial courts. We have



received some favorable and unfavorable decisions, and we cannot predict the amount of time required before final judicial resolutions.

DNPM's assessments initially covered a period of up to 20 years before their issuances, 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 are 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. This conclusion is consistent with recent decisions of the Superior Court of Justice ("STJ"), and we expect that the DNPM will revise all the assessments to exclude charges that are time barred under this legal opinion.

### ***b) ICMS tax assessments and legal proceedings***

We are engaged in several administrative and court proceedings relating to additional charges of value-added tax on services and circulation of goods (ICMS) by the tax authorities of different Brazilian states. In each of these proceedings, the tax authorities claim that (i) certain credits we have deducted from our payments of ICMS were not deductible; (ii) we have failed to comply with certain accessory obligations; (iii) are required to pay the ICMS on electricity purchases and (iv) we are required to pay ICMS in connection with goods that we bring into the State of Pará. We estimate our possible losses resulting from these proceedings in R\$3.0 billion.

In 2017, we joined the Programa de Regularização de Créditos Tributários ("PRCT"), a state program for ICMS tax settlement in the state of Minas Gerais. Pursuant to the PRCT, we paid a total amount of R\$93 million, subject to adjustments, to settle approximately R\$1.5 billion in ICMS taxes in dispute in Minas Gerais.

The PRCT settlement does not include tax assessments involving ICMS charges over the costs of transportation of iron ore directly by us. The tax authorities of the State of Minas Gerais contend that we should have paid ICMS in relation to the transportation of iron ore, but we understand that ICMS is not applicable to this activity because the ore was transported directly by us. The State of Minas Gerais court has decided in our favor with respect to tax assessments covering activities in 2009 and 2010 in an aggregate amount of R\$608 million. With respect to activities in 2011, 2012 and 2013, the amount in dispute is R\$917 million. We expect a favorable outcome in all these cases, and for this reason we have not included these taxes in the PRCT.

In connection with a legal proceeding relating to ICMS, prosecutors in the state of Rio de Janeiro are seeking criminal charges against members of management of our subsidiary MBR, alleging tax fraud. The defense has presented its case in the criminal proceeding against these individuals and a decision is pending. The amount involved in the underlying tax proceeding is small (approximately R\$11 million). We believe that these allegations are without merit.

### ***c) Litigation on Brazilian taxation of foreign subsidiaries***

We are engaged in legal proceedings concerning the contention of the Brazilian federal tax authority (*Receita Federal*) that we should pay Brazilian corporate income tax and social security contributions on the net income of our non-Brazilian subsidiaries and affiliates. The position of the tax authority is based on Article 74 of Brazilian Provisional Measure 2,158-34/2001 ("Article 74"), a tax regulation issued in 2001.

In 2013, we significantly reduced the amount in dispute by participating in the REFIS, a federal tax settlement program for payment of amounts relating to Brazilian corporate income tax and social



contribution. We settled the claims related to the net income of our non-Brazilian subsidiaries and affiliates from 2003 to 2012, and we continue to dispute the assessments with respect to 1996 to 2002. Under the REFIS, we paid US\$2.6 billion in 2013, and we agreed to pay the remaining US\$7.0 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. On December 31, 2017, the SELIC rate was 7.0% per annum (as compared to 13.75% per annum on December 31, 2016). As of December 31, 2017, the remaining balance was US\$5.249 billion, to be paid in 130 further installments.

We had initiated a direct legal proceeding (*mandado de segurança*) in 2003 challenging the tax authority's position. In December 2013, as required by the REFIS statute, we waived the legal arguments with respect to the period between 2003 and 2012. We are continuing our direct legal proceeding with respect to the years not included in the REFIS. At December 31, 2017, the total amount in dispute for the period between 1996 and 2002 was R\$2.277 billion. In 2014, the Superior Court of Justice (STJ) ruled in our favor on certain of our arguments against those assessments. The tax authorities filed an appeal before the Federal Supreme Court and a decision is pending.

#### **d) Assessments and legal proceedings related to PIS/COFINS**

Between 2011 and 2017, we received tax assessments from the Brazilian federal tax authority contending that we incorrectly claimed PIS and COFINS tax credits for the period between 2004 and 2011. PIS and COFINS are taxes imposed by the Brazilian government on our gross revenues, which may be partially offset by credits resulting from PIS and COFINS payments made by our suppliers. The tax authorities claim that (i) some credits we have deducted from our payments of PIS and COFINS were not deductible and (ii) we have not submitted adequate evidence of certain other credits. We are contesting these assessments in the administrative level. The total amount in dispute is R\$3.8 billion.

#### **e) Income tax assessments**

In 2004, a decision of the Brazilian Superior Court of Justice (STJ) granted us the right to deduct the amounts we pay as social security contributions on the net income (CSLL) from our taxable income. In 2006, the Brazilian federal tax authorities commenced a rescission action (*ação rescisória*) against us, seeking the reversal of the 2004 decision. The rescission action was rejected by the federal court in Rio de Janeiro and by the Federal Court of Appeals (TRF) of the Second Region. The tax authorities appealed to the Superior Court of Justice (STJ) and to the Supreme Court (STF), and the STJ determined that the TRF had not properly considered one of the questions raised by the Federal Government, and remanded the case for further decision of the TRF. If the courts decide for rescission of the 2004 decision, we will no longer be able to deduct the CSLL from our future taxable income, and the decision will determine whether or not we will be required to supplement the income tax payments we made between 2003 and 2016. As of December 31, 2017, the total CSLL deducted from our taxable income between 2003 and 2017 was R\$6.652 billion.

#### **f) Fines on the undue deduction of tax credits**

In 2017, we received multiple assessments from the Brazilian federal tax authority imposing fines due to allegedly undue deduction of tax credits from our payments of income tax and contributions on the net income (CSLL). In these cases, the tax authority challenged our right to set off certain tax credits and issued assessments imposing fines in the amount of 50% of the amount that was unduly deducted. As of December 31, 2017, the total amount of fines imposed under these assessments were R\$408.8 million, and new assessments are expected. We are challenging these assessments in administrative proceedings. These assessments cover only the fines resulting from the allegedly undue deductions, as the principal amount of unpaid taxes, interest and other penalties for late payment are being discussed in separate

administrative proceedings. If we succeed in these separate administrative proceedings, the corresponding fines are expected to be cancelled. The legal grounds for these fines are currently being discussed by another company before the Federal Supreme Court (STF), and a favorable decision to this other company will be applicable to other taxpayers, including us.

# MEMORANDUM AND ARTICLES OF ASSOCIATION

## 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*

Pursuant to Brazilian corporate law, on-controlling shareholders holding common shares representing at least 15% of a company's voting capital have the right to appoint one member and an alternate to the board of directors. If no group of common shareholders meets this threshold, shareholders representing at least 10% of the total share capital are entitled to combine their holdings to appoint one member and

an alternate to the Board of Directors. Non-controlling holders of common shares may also elect one member of the Fiscal Council and an alternate, pursuant to applicable CVM rules. Holders of the golden shares may elect one member of the permanent Fiscal Council and the respective alternate.

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.

### ***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, if necessary, 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, this notice to shareholders is required to be published no fewer than three times, in the *Diário Oficial do Estado do Rio de Janeiro* and in a newspaper with general circulation in the city where we have our registered office, in Rio de Janeiro—*Valor Econômico—Estado do Rio de Janeiro* is the newspaper currently designated 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. See—*Common shares and preferred shares*.

A shareholders' meeting may be held if shareholders representing at least one-quarter of the voting capital are present, except as otherwise provided, including 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 as 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 chairman or, in case of his absence, by the vice-chairman of our Board of Directors. In the case of temporary impediment or absence of the chairman or vice-chairman of the Board of Directors, the shareholders' meetings may be chaired by their respective alternates, or in the absence or impediment of such alternates, by a director or other person especially appointed by the chairman 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.

### **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 (a) a merger, (b) a stock merger as described in clause (i) above or (c) 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.

The 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 prescribe that we must 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 inadvisable in light of our financial condition. To date, our Board of Directors has never determined that payment of the mandatory dividend was inadvisable. 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—*Calculation of distributable amount*.

### **Distributions classified as shareholders' 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.

## SHAREHOLDER DEBENTURES

At the time of the first stage of our privatization in 1997, we issued shareholder revenue interests 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 the relevant mineral resources are exhausted.

We made available for withdrawal by holders of shareholder debentures US\$65 million in 2015, US\$84 million in 2016 and US\$135 million in 2017. In October 2013, the accumulated sales volume of iron ore from the Northern System reached the relevant threshold established in the debentures deed, which triggered our obligation to make additional semi-annual payments of the premium on iron ore products, starting in 2014. See note 13 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 Resolution No. 4,373/2014 of the CMN, foreign investors may invest in almost all financial assets and engage in almost all transactions available in the Brazilian financial and capital markets, provided that certain requirements are fulfilled. In accordance with Resolution No. 4,373/2014, the definition of foreign investor includes individuals, legal entities, mutual funds and other collective investment entities, domiciled or headquartered outside Brazil.

Under Resolution No. 4,373/2014, a foreign investor must:

- 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 (1) is not a financial institution.

Resolution No. 4,373/2014 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 No. 4,373/2014 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 No. 4,373/2014 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 No. 4,131/1962 and Resolution No. 4,373/2014. Thereafter, unless the holder has registered its investment

### *Exchange Controls and Other Limitations Affecting Security Holders*

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-Brazilian 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-Brazilian Holder. Therefore, Non-Brazilian 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, 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, (ii) 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 tax benefit to the Company in the case 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-Brazilian Holders on capital gains depends on the status of the holder as either:

- 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 No. 4,373/2014 (a 4,373 Holder), or (ii) a holder of ADSs; or
- any other Non-Brazilian Holder.

Investors identified in items (i) or (ii) are subject to favorable tax treatment, as described below.

Capital gains realized by a Non-Brazilian 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-Brazilian 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-Brazilian 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-Brazilian Holder on the disposition of ADSs. Consequently, gains on a disposition of ADSs by a Non-Brazilian Holder (whether in a transaction carried out with another Non-Brazilian 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-Brazilian Holder;
- the method by which such Non-Brazilian 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.

Through December 31, 2017, any gain realized by a Non-Brazilian Holder on a sale or disposition of common shares carried out on the Brazilian stock exchange was:

- exempt from income tax where the Non-Brazilian 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-Brazilian Holder either (A) (i) is not a 4,373 Holder and (ii) is not resident or domiciled in a Low Tax Jurisdiction or (B) (i) is a 4,373 Holder and (ii) is resident or domiciled in a Low Tax Jurisdiction; or
- subject to income tax at a rate of 25% where the Non-Brazilian Holder (i) is not a 4,373 Holder and (ii) is resident or domiciled in a Low Tax Jurisdiction.

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.

Beginning on January 1, 2017, the taxation regime for capital gains in Brazil was significantly amended. Under the new regime, capital gains realized by non-Brazilian residents and individuals resident in Brazil are subject to progressive taxation, and the rates range from 15% to 22.5% as described below:

- 15% on the portion of gains up to R\$5 million;
- 17.5% on the portion of gains above R\$5 million and below R\$10 million;
- 20% on the portion of gains above R\$10 million and below R\$30 million; and
- 22.5% on the portion of gains exceeding R\$30 million.

We believe that this new regime of capital gains taxation replaces previous instances of taxation at the rate of 15%, but does not change the rate of 25% applicable to residents in a Low Tax Jurisdiction. You should consult your own tax advisors concerning the implications of these rules in light of your particular circumstances.

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-Brazilian 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-Brazilian 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-Brazilian 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-Brazilian Holder, except for gift and inheritance taxes which are levied by some states of Brazil on gifts made or inheritances bestowed by a Non-Brazilian 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
- 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, 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 depositary 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 depositary 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 capital for Brazilian tax purposes, out of our current or accumulated earnings and profits (as determined for U.S. federal income tax purposes) 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.

You 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 depositary, in the case of ADSs, or by you, in the case of common shares. If the depositary 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 would be ordinary loss or gain, 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 2017 taxable year. 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 2018 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. In addition, the U.S. Treasury has announced its intention to promulgate rules pursuant to which holders of ADSs or common shares and intermediaries through whom such securities are held will be permitted to rely on certifications from issuers to establish that dividends are treated as qualified dividends. Because such procedures have not yet been issued, it is unclear whether we will be able to comply with them. 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 will 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. 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 shares 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 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 will be U.S. source gain or loss for U.S. foreign tax credit purposes. Consequently, if a Brazilian withholding tax is imposed on the sale or disposition of ADSs or common shares, and you do not receive significant foreign source income from other sources, you may not be able to derive effective U.S. foreign tax credit benefits in respect of such Brazilian withholding 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 shares, 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.

### ***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 United States 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.

## 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, 2017. 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 our disclosure controls and procedures 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. 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, 2017 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, 2017. The effectiveness of our internal control over financial reporting as of December 31, 2017 has been audited by KPMG Auditores Independentes, an independent registered public accounting firm, as stated in their report which appears herein.

Our management identified no change in our internal control over financial reporting during our fiscal year ended December 31, 2017 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.

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
303A.01	A listed company must have a majority of independent directors.	We do not have a majority of independent directors. At least 20% of our board of directors is composed of independent directors, as required under Novo Mercado listing rules and our bylaws.
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.
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. However, we do have a Personnel Committee and a Compliance and Risk 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 Personnel Committee is responsible, among other matters, for:</p> <ul style="list-style-type: none"> <li>• supporting the Board of Directors in the process of selecting and appointing the Chief Executive Officer, and evaluating the Chief Executive Officer's appointment of other executives;</li> <li>• evaluating and recommending adjustments to corporate governance best practices concerning the structure, size and composition of the Board of Directors and the Advisory Committees, as well as the balance of experiences, knowledge and diversity of the profiles of their members;</li> <li>• identifying and recommending potential candidates to be directors and members of the Advisory Committees; and</li> <li>• supporting the Chairman of the Board of Directors in organizing the process for performance evaluation of the Board of Directors and Advisory Committees.</li> </ul> <p>According to its charter, the Compliance and Risk Committee is responsible, among other matters, for:</p> <ul style="list-style-type: none"> <li>• ensuring the adoption and improvement of good practices of compliance and integrity, including evaluating events of potential conflicts of interest;</li> </ul>

Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
		<ul style="list-style-type: none"> <li>● monitoring the scope of activities and effectiveness of the departments in charge of our corporate governance, compliance, corporate integrity, risk management and controls and proposing improvements;</li> <li>● evaluating proposals for modifying the corporate governance documents, such as the By-Laws, the Code of Ethics and Conduct and written charters of our Advisory Committees and Board of Directors, in addition to other policies and documents which are not the responsibility of other committees;</li> <li>● ensuring the effectiveness of mechanisms to handle conflicts of interests in our transactions, as well as opining on related party transactions submitted for resolution of the Board of Directors, pursuant to the Policy on Transactions with Related Parties; and</li> <li>● promoting, monitoring and ensuring the development and efficacy of the our governance model, assuring that all initiatives are in line with the best practices and are in synergy;</li> </ul> <p>These committees' charters allow for the inclusion of one independent member. For this purpose, an independent member is a person who:</p> <ul style="list-style-type: none"> <li>● Has no current link to Vale, except for membership on an Advisory Committee or a non-material shareholding in our share capital or investment in our bonds, and is not financially dependent on compensation from us;</li> <li>● Has not been an employee of the Company (or of its subsidiaries) or of a direct or indirect controlling shareholder, or a representative of any direct or indirect controlling shareholder for, at least, three years;</li> <li>● Does not provide, purchase or offer (trade), directly or indirectly, services and/or products to us on a scale that is material to that person or to us;</li> <li>● Is not linked to a controlling shareholder, member of the controlling group or of another group with material shareholding, the spouse or relative up to the second degree of the foregoing, or connected to entities related to a controlling shareholder;</li> <li>● Is not a spouse or relative up to the second degree of any officer or manager of Vale;</li> <li>● Has not been a partner, in the past three years, of an auditing firm that audits or has audited Vale in this same period; and</li> <li>● Is not a member of a non-profit entity that receives significant financial funds from us or from our related parties.</li> </ul>



Section	NYSE corporate governance rule for U.S. domestic issuers	Our approach
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.</p> <p>However, we have a Personnel 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:</p> <ul style="list-style-type: none"> <li>● evaluating our general human resources policies as submitted by the Executive Board to the Board of Directors;</li> <li>● evaluating and adjusting the compensation model of members of the Executive Board;</li> <li>● aiding the Board of Directors in setting and monitoring goals for the performance evaluation of the Executive Board and other leaders who report directly to the Chief Executive Officer, and of those in charge of Vale's Governance Office, Internal Auditing and Ombudsman.</li> </ul>
303A.06	A listed company must have an audit committee with a	In lieu of appointing an audit committee composed of
303A.07	a minimum of three independent directors who satisfy the independence requirements of Rule 10A-3 under the Exchange Act, with a written charter that covers certain minimum specified duties.	<p>independent members of the Board of Directors, we have established a permanent <i>conselho fiscal</i>, or fiscal council, in accordance with the applicable provisions of Brazilian corporate law, and provided the fiscal council with additional powers to permit it to meet the requirements of Exchange Act Rule 10A-3(c)(3).</p> <p>Under our bylaws, the Fiscal Council shall have between three and five members. Under Brazilian corporate law, which provides standards for the independence of the Fiscal Council from us and our management, none of the members of the Fiscal Council may be a member of the Board of Directors or an executive officer. Management does not elect any Fiscal Council member. Our Board of Directors has determined that one of the members of our Fiscal Council meets the New York Stock Exchange independence requirements that would apply to audit committee members in the absence of our reliance on Exchange Act Rule 10A-3(c)(3).</p> <p>The responsibilities of the Fiscal Council are set forth in its charter. Under our bylaws, the charter must give the Fiscal Council responsibility for the matters required under Brazilian corporate law, as well as responsibility for:</p> <ul style="list-style-type: none"> <li>● establishing procedures for the receipt, retention and treatment of complaints related to accounting, controls and audit issues, as well as procedures for the confidential, anonymous submission of concerns regarding such matters;</li> <li>● recommending and assisting the Board of Directors in the appointment, establishment of compensation and dismissal of independent auditors;</li> <li>● pre-approving services to be rendered by the independent auditors;</li> <li>● overseeing the work performed by the independent auditors, with powers to recommend withholding the payment of compensation to the independent auditors; and</li> </ul>

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.	<ul style="list-style-type: none"> <li>mediating disagreements between management and the independent auditors regarding financial reporting.</li> </ul>
303A.09	A listed company must adopt and disclose corporate governance guidelines that cover certain minimum specified subjects.	Under Brazilian corporate law, shareholder pre-approval is required for the adoption of any equity compensation plans.
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 not published formal corporate governance guidelines.
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 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.</p>	<p>We have adopted a formal code of ethics and conduct, which applies to our directors, officers and employees. We report each year in our annual report on Form 20-F any waivers of the code of ethics and conduct granted for directors or executive officers. Our code of ethics and conduct has a scope that is similar, but not identical, to that required for a U.S. domestic company under the NYSE rules.</p> <p>We are subject to (b) and (c) of these requirements, but not (a).</p>

## CODE OF ETHICS AND CONDUCT

We have a code of ethics and conduct that applies to our employees and to the members of our Board of Directors and our Board of Executive Officers, including the chief executive officer, the chief financial officer and the principal accounting officer. We have posted this code of ethics and conduct on our website, at: <http://www.vale.com> (under English Version/Investors/The Company/Corporate Governance/Policies). Copies of our code of ethics and conduct may be obtained without charge by writing to us at the address set forth on the front cover of this Form 20-F. We have not granted any implicit or explicit waivers from any provision of our code of ethics and conduct since its adoption.

## PRINCIPAL ACCOUNTANT FEES AND SERVICES

The following table summarizes the fees billed to us by our independent auditors KPMG Auditores Independentes for professional services in 2017 and 2016:

	Year ended December 31,	
	2016	2017
	(US\$ thousand)	
Audit fees .....	6,084	6,159
Audit-related fees .....	63	90
Other fees .....	6	18
Total fees .....	6,143	6,267

“Audit fees” are the aggregate fees billed by KPMG Auditores Independentes 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 KPMG Auditores Independentes 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, the SEC and the French securities regulator Autorité des Marchés Financiers.

- *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, as with all of our security filings, 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 may be inspected and copied at the public reference facilities maintained by the SEC at 100 F Street, N.E., Washington, D.C., 20549. You can obtain further information about the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. 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. Our SEC filings are also available to the public from the SEC at <http://www.sec.gov>. For further information on obtaining copies of Vale's public filings at the New York Stock Exchange, you should call (212) 656-5060.
- *France.* As a result of the admission of the ADSs to listing and trading on NYSE Euronext Paris, we must comply with certain French periodic and ongoing disclosure rules (for example, annual report with audited financial statements and interim financial statements). In general, the Company is deemed to comply with the French periodic and ongoing disclosure rules through its compliance with U.S. disclosures.

# EXHIBITS

## Exhibit Number

- 1 Bylaws of Vale S.A., as amended on December 21, 2017
- 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)
- 8 List of subsidiaries
- 10.1 Stock Purchase Agreement, dated as of December 19, 2016, by and among Vale S.A., Vale Fertilizer Netherlands B.V. and The Mosaic Company, incorporated by reference to Exhibit 2.1 to Mosaic's current report on Form 8-K dated December 19, 2016 (File No. 001-32327, Accession No. 0001193125-16-796869)
- 10.24 Shareholders' Agreement, dated August 14, 2017, among Litel Participações S.A., Litela Participações S.A., Bradespar S.A., Mitsui & Co., Ltd. and BNDESPAR Participações S.A. — BNDESPAR incorporated by reference to the current report on Form 6-K furnished to the Securities and Exchange Commission on August 15, 2017 (File No. 001-15030, Accession No. 0001104659-17-051910)
- 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 KPMG Auditores Independentes
- 101 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.
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.
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.

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 a particular 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.
Hard 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).
Hematite Ore .....	Hematite is an iron oxide mineral, but also denotes the high-grade iron ore type within the iron deposits.
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.
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.
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 resource .....	A concentration or occurrence of minerals of economic interest in such form and quantity that could justify an eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a mineral resource are known, estimated or interpreted from specific geological evidence through drill holes, trenches and/or outcrops. Mineral resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured Resources.
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 komatite.
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.
Nitric acid .....	Nitric acid is manufactured from ammonia and is a key chemical in the manufacture of fertilizers. The acid from the absorption towers typically contains 53-61% nitric acid by mass. Uses for diluted nitric acid other than fertilizer production include metallurgy, cleaning (in food industries) and nylon for the textile industry.
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.
Potash .....	A potassium chloride compound, chiefly KCl, used as simple fertilizer and in the production of mixture fertilizer.
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 (indicated) reserves .....	Reserves for which quantity and grade and/or quality are computed from information similar to that used for proven (measured) reserves, but the sites for inspection, sampling and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for proven (measured) reserves, is high enough to assume continuity between points of observation.
Proven (measured) reserves .....	Reserves for which (a) quantity is computed from dimensions revealed in outcrops, trenches, working or drill holes; grade and/or quality are computed from the results of detailed sampling and (b) the sites for inspection, sampling and measurement are spaced so closely and the geologic character is so well defined that size, shape, depth and mineral content of reserves are well-established.
Real, reais or R\$ .....	The official currency of Brazil is the <i>real</i> (singular) (plural: <i>reais</i> ).
Reserves (ore/mineral) .....	The part of a mineral deposit that could be economically and legally extracted or produced at the time of the reserve determination.
ROM .....	Run-of-mine. Ore in its natural (unprocessed) state, as mined, without having been crushed.
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.
Slabs .....	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.
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.
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/ FABIO SCHVARTSMAN

Name: Fabio Schvartsman

Title: Chief Executive Officer

By: /s/ LUCIANO SIANI PIRES

Name: Luciano Siani Pires

Title: Chief Financial Officer

Date: April 12, 2018

## Vale S.A. Financial Statements

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www.kpmg.com.br

## Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors  
Vale S.A.  
Rio de Janeiro – RJ

### ***Opinions on the Consolidated Financial Statements and Internal Control Over Financial Reporting***

We have audited the accompanying consolidated statements of financial position of Vale S.A. and subsidiaries (“Vale” or “the Company”) as of December 31, 2017 and 2016, and the related consolidated statements of income, comprehensive income (loss), changes in equity and cash flows for each of the years in the three-year period ended December 31, 2017, and the related notes (collectively, the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control—Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2017, in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control—Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

KPMG Auditores Independentes, uma sociedade simples brasileira e firma-membro da rede KPMG de firmas-membro independentes e afiliadas à KPMG International Cooperative (“KPMG International”), uma entidade suíça.

*KPMG Auditores Independentes, a Brazilian entity and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative (“KPMG International”), a Swiss entity.*



### ***Basis for Opinion***

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's consolidated financial statements and an opinion on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

### ***Definition and Limitations of Internal Control Over Financial Reporting***

A company's 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. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary 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 (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's 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 effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ KPMG Auditores Independentes

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KPMG Auditores Independentes

We have served as the Company's auditor since 2014.  
Rio de Janeiro, RJ  
February 27, 2018



## Management's Report on Internal Control over Financial Reporting

The management of Vale S.A (Vale) is responsible for establishing and maintaining adequate internal control over financial reporting.

The Vale's 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. The company's 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 the company's 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 because of changes in conditions, and that the degree of compliance with the policies or procedures may deteriorate.

Vale's management has assessed the effectiveness of the company's internal control over financial reporting as of December 31, 2017 based on the criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on such assessment and criteria, Vale's management has concluded that the company's internal control over financial reporting are effective as of December 31, 2017.

The effectiveness of the company's internal control over financial reporting as of December 31, 2017 has been audited by KPMG Auditores Independentes, an independent registered public accounting firm, as stated in their report which appears herein.

February 27th, 2018.

/s/ Fabio Schvartsman

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Fabio Schvartsman  
Chief Executive Officer

/s/ Luciano Siani

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Luciano Siani  
Chief Financial Officer and Investors Relations



**Consolidated Income Statement**  
**In millions of United States dollars, except earnings per share data**

	Notes	Year ended December 31		
		2017	2016	2015
<b>Continuing operations</b>				
Net operating revenue.....	3(d)	33,967	27,488	23,384
Cost of goods sold and services rendered .....	5(a)	(21,039)	(17,650)	(18,751)
<b>Gross profit</b> .....		<b>12,928</b>	<b>9,838</b>	<b>4,633</b>
<b>Operating expenses</b>				
Selling and administrative expenses .....	5(b)	(531)	(507)	(612)
Research and evaluation expenses .....		(340)	(319)	(395)
Pre operating and operational stoppage .....		(413)	(453)	(942)
Other operating expenses, net .....	5(c)	(420)	(267)	(207)
		<b>(1,704)</b>	<b>(1,546)</b>	<b>(2,156)</b>
Impairment and other results on non-current assets .....	15, 18 and 19	(294)	(1,240)	(8,708)
<b>Operating income (loss)</b> .....		<b>10,930</b>	<b>7,052</b>	<b>(6,231)</b>
Financial income.....	6	3,404	7,968	7,792
Financial expenses.....	6	(6,423)	(6,125)	(18,446)
Equity results in associates and joint ventures .....	15	98	309	(445)
Impairment and other results in associates and joint ventures ..	15, 19 and 21	(180)	(1,220)	(349)
<b>Income (loss) before income taxes</b> .....		<b>7,829</b>	<b>7,984</b>	<b>(17,679)</b>
<b>Income taxes</b>				
Current tax.....	8	(849)	(943)	(332)
Deferred tax .....		(646)	(1,838)	5,581
		<b>(1,495)</b>	<b>(2,781)</b>	<b>5,249</b>
<b>Net income (loss) from continuing operations</b> .....		<b>6,334</b>	<b>5,203</b>	<b>(12,430)</b>
Net income (loss) attributable to noncontrolling interests .....		21	(8)	(501)
<b>Net income (loss) from continuing operations attributable to Vale's stockholders</b> .....		<b>6,313</b>	<b>5,211</b>	<b>(11,929)</b>
<b>Discontinued operations</b>				
Loss from discontinued operations.....	14	(813)	(1,227)	(190)
Net income (loss) attributable to noncontrolling interests .....		(7)	2	10
<b>Loss from discontinued operations attributable to Vale's stockholders</b> .....		<b>(806)</b>	<b>(1,229)</b>	<b>(200)</b>
<b>Net income (loss)</b> .....		<b>5,521</b>	<b>3,976</b>	<b>(12,620)</b>
Net income (loss) attributable to noncontrolling interests .....		14	(6)	(491)
<b>Net income (loss) attributable to Vale's stockholders</b> .....		<b>5,507</b>	<b>3,982</b>	<b>(12,129)</b>
<b>Earnings (loss) per share attributable to Vale's stockholders:</b>				
<b>Basic and diluted earnings (loss) per share (restated):</b> .....	9			
Common share (US\$) .....		1.05	0.77	(2.33)

The accompanying notes are an integral part of these financial statements.



**Consolidated Statement of Comprehensive Income**  
**In millions of United States dollars**

	Year ended December 31		
	2017	2016	2015
Net income (loss) .....	5,521	3,976	(12,620)
<b>Other comprehensive income (loss):</b>			
<b>Items that will not be reclassified subsequently to the income statement</b>			
Translation adjustments .....	(717)	6,460	(18,128)
Retirement benefit obligations .....	(46)	(70)	69
<b>Total items that will not be reclassified subsequently to the income statement, net of tax .....</b>	<b>(763)</b>	<b>6,390</b>	<b>(18,059)</b>
<b>Items that may be reclassified subsequently to the income statement</b>			
Translation adjustments .....	1,026	(3,677)	10,244
Available-for-sale financial instruments .....	-	1	1
Cash flow hedge .....	-	10	816
Net investments hedge .....	(95)	-	-
Transfer of realized results to net income .....	(11)	(78)	(369)
<b>Total of items that may be reclassified subsequently to the income statement, net of tax .....</b>	<b>920</b>	<b>(3,744)</b>	<b>10,692</b>
<b>Total comprehensive income (loss) .....</b>	<b>5,678</b>	<b>6,622</b>	<b>(19,987)</b>
Comprehensive income (loss) attributable to noncontrolling interests .....	13	111	(543)
<b>Comprehensive income (loss) attributable to Vale's stockholders .....</b>	<b>5,665</b>	<b>6,511</b>	<b>(19,444)</b>
From continuing operations .....	5,696	6,642	(19,550)
From discontinued operations .....	(31)	(131)	106
	<b>5,665</b>	<b>6,511</b>	<b>(19,444)</b>

Items above are stated net of tax and the related taxes are disclosed in note 8.

The accompanying notes are an integral part of these financial statements.



**Consolidated Statement of Cash Flows**  
In millions of United States dollars

	Year ended December 31		
	2017	2016	2015
<b>Cash flow from operating activities:</b>			
Income (loss) before income taxes from continuing operations .....	7,829	7,984	(17,679)
<b>Continuing operations adjustments for:</b>			
Equity results in associates and joint ventures .....	(98)	(309)	445
Impairment and other results on non-current assets .....	294	1,240	8,708
Impairment and other results in associates and joint ventures .....	180	1,220	349
Depreciation, amortization and depletion .....	3,708	3,487	3,719
Financial results, net .....	3,019	(1,843)	10,654
<b>Changes in assets and liabilities:</b>			
Accounts receivable .....	1,277	(2,744)	1,671
Inventories .....	(339)	288	(217)
Suppliers and contractors .....	232	243	658
Provision—Payroll, related charges and others remunerations .....	372	133	(578)
Other taxes assets and liabilities, net .....	(297)	(109)	(222)
Deferred revenue—Gold stream .....	—	524	532
Other assets and liabilities, net .....	(615)	441	(456)
	<b>15,562</b>	<b>10,555</b>	<b>7,584</b>
Interest on loans and borrowings paid .....	(1,686)	(1,663)	(1,457)
Derivatives paid, net .....	(240)	(1,602)	(1,202)
Interest on participative stockholders' debentures paid .....	(135)	(84)	(65)
Income taxes .....	(563)	(388)	(544)
Income taxes—Settlement program .....	(488)	(417)	(384)
<b>Net cash provided by operating activities from continuing operations .....</b>	<b>12,450</b>	<b>6,401</b>	<b>3,932</b>
<b>Cash flow from investing activities:</b>			
Financial investments redeemed (invested) .....	(90)	12	308
Loans and advances—net receipts (payments) (note 21) .....	(445)	(210)	(17)
Guarantees and deposits—net receipts (payments) .....	(48)	(41)	(67)
Additions to investments .....	(93)	(239)	(65)
Additions to property, plant and equipment and intangible .....	(3,831)	(4,951)	(8,114)
Proceeds from disposal of assets and investments (note 15) .....	922	543	1,456
Dividends and interest on capital received from associates and joint ventures .....	227	193	318
Proceeds from gold stream transaction .....	—	276	368
<b>Net cash used in investing activities from continuing operations .....</b>	<b>(3,358)</b>	<b>(4,417)</b>	<b>(5,813)</b>
<b>Cash flow from financing activities:</b>			
<b>Loans and borrowings</b>			
Additions .....	1,976	6,994	4,995
Repayments .....	(8,998)	(7,717)	(2,753)
<b>Transactions with stockholders:</b>			
Dividends and interest on capital attributed to stockholders .....	(1,456)	(250)	(1,500)
Dividends and interest on capital paid to noncontrolling interest .....	(126)	(291)	(15)
Transactions with noncontrolling stockholders (note 15) .....	(98)	(17)	1,049
<b>Net cash provided by (used in) financing activities from continuing operations .....</b>	<b>(8,702)</b>	<b>(1,281)</b>	<b>1,776</b>
<b>Net cash provided by (used in) discontinued operations (note 14) .....</b>	<b>(252)</b>	<b>(118)</b>	<b>140</b>
<b>Increase in cash and cash equivalents .....</b>	<b>138</b>	<b>585</b>	<b>35</b>
Cash and cash equivalents in the beginning of the year .....	4,262	3,591	3,974
Effect of exchange rate changes on cash and cash equivalents .....	(60)	86	(418)
Effects of disposals of subsidiaries and merger, net on cash and cash equivalents .....	(12)	—	—
<b>Cash and cash equivalents at end of the year .....</b>	<b>4,328</b>	<b>4,262</b>	<b>3,591</b>
<b>Non-cash transactions:</b>			
Additions to property, plant and equipment—capitalized loans and borrowing costs .....	370	653	761

The accompanying notes are an integral part of these financial statements.



**Consolidated Statement of Financial Position**  
**In millions of United States dollars**

	Notes	December 31, 2017	December 31, 2016
<b>Assets</b>			
<b>Current assets</b>			
Cash and cash equivalents .....	20	4,328	4,262
Accounts receivable .....	10	2,600	3,663
Other financial assets .....	13	2,022	292
Inventories .....	11	3,926	3,349
Prepaid income taxes .....		781	159
Recoverable taxes .....	12	1,172	1,625
Others .....		538	628
		<b>15,367</b>	<b>13,978</b>
Non-current assets held for sale .....	14	3,587	8,589
		<b>18,954</b>	<b>22,567</b>
<b>Non-current assets</b>			
Judicial deposits .....	27(c)	1,986	962
Other financial assets .....	13	3,232	626
Prepaid income taxes .....		530	527
Recoverable taxes .....	12	638	727
Deferred income taxes .....	8(a)	6,638	7,343
Others .....		267	276
		<b>13,291</b>	<b>10,461</b>
Investments in associates and joint ventures .....	15	3,568	3,696
Intangibles .....	17	8,493	6,871
Property, plant and equipment .....	18	54,878	55,419
		<b>80,230</b>	<b>76,447</b>
<b>Total assets</b> .....		<b>99,184</b>	<b>99,014</b>
<b>Liabilities</b>			
<b>Current liabilities</b>			
Suppliers and contractors .....		4,041	3,630
Loans and borrowings .....	20	1,703	1,660
Other financial liabilities .....	13	374	767
Taxes payable .....	8(d)	697	657
Provision for income taxes .....		355	171
Liabilities related to associates and joint ventures .....	21	326	292
Provisions .....	25	1,394	952
Dividends and interest on capital .....	29(d)	1,441	816
Others .....		1,604	1,197
		<b>11,935</b>	<b>10,142</b>
Liabilities associated with non-current assets held for sale .....	14	1,179	1,090
		<b>13,114</b>	<b>11,232</b>
<b>Non-current liabilities</b>			
Loans and borrowings .....	20	20,786	27,662
Other financial liabilities .....	13	2,894	2,087
Taxes payable .....	8(d)	4,890	4,961
Deferred income taxes .....	8(a)	1,719	1,700
Provisions .....	25	7,027	5,748
Liabilities related to associates and joint ventures .....	21	670	785
Deferred revenue—Gold stream .....		1,849	2,090
Others .....		1,463	1,725
		<b>41,298</b>	<b>46,758</b>
<b>Total liabilities</b> .....		<b>54,412</b>	<b>57,990</b>
<b>Stockholders' equity</b>			
Equity attributable to Vale's stockholders .....	29	43,458	39,042
Equity attributable to noncontrolling interests .....		1,314	1,982
<b>Total stockholders' equity</b> .....		<b>44,772</b>	<b>41,024</b>
<b>Total liabilities and stockholders' equity</b> .....		<b>99,184</b>	<b>99,014</b>

The accompanying notes are an integral part of these financial statements.



**Consolidated Statement of Changes in Equity**  
In millions of United States dollars

	Share capital	Results on conversion of shares	Capital reserve	Results from operation with noncontrolling interest	Profit reserves	Treasury stocks	Unrealized fair value gain (losses)	Cumulative translation adjustments	Retained earnings	Equity attributable to Vale's stockholders	Equity attributable to noncontrolling interests	Total stockholders' equity
<b>Balance at December 31, 2014</b>	<b>61,614</b>	<b>(152)</b>	<b>-</b>	<b>(449)</b>	<b>19,985</b>	<b>(1,477)</b>	<b>(1,713)</b>	<b>(22,686)</b>	<b>-</b>	<b>55,122</b>	<b>1,199</b>	<b>56,321</b>
<b>Loss</b>	-	-	-	-	-	-	-	-	(12,129)	(12,129)	(491)	(12,620)
<b>Other comprehensive income:</b>												
Retirement benefit obligations	-	-	-	-	-	-	70	-	-	70	(1)	69
Cash flow hedge	-	-	-	-	-	-	447	-	-	447	-	447
Available-for-sale financial instruments	-	-	-	-	-	-	1	-	-	1	-	1
Translation adjustments	-	-	-	-	(5,371)	-	203	(2,665)	-	(7,833)	(51)	(7,884)
<b>Transactions with stockholders:</b>												
Dividends and interest on capital of Vale's stockholders	-	-	-	-	(1,500)	-	-	-	-	(1,500)	-	(1,500)
Dividends of noncontrolling interest	-	-	-	-	-	-	-	-	-	-	(32)	(32)
Acquisitions and disposal of noncontrolling interest (note 15)	-	-	-	(253)	-	-	-	(336)	-	(589)	1,455	866
Capitalization of noncontrolling interest advances	-	-	-	-	-	-	-	-	-	-	36	36
Appropriation to undistributed retained earnings	-	-	-	-	(12,129)	-	-	-	12,129	-	-	-
<b>Balance at December 31, 2015</b>	<b>61,614</b>	<b>(152)</b>	<b>-</b>	<b>(702)</b>	<b>985</b>	<b>(1,477)</b>	<b>(992)</b>	<b>(25,687)</b>	<b>-</b>	<b>33,589</b>	<b>2,115</b>	<b>35,704</b>
<b>Net income (loss)</b>	-	-	-	-	-	-	-	-	3,982	3,982	(6)	3,976
<b>Other comprehensive income:</b>												
Retirement benefit obligations	-	-	-	-	-	-	(70)	-	-	(70)	-	(70)
Cash flow hedge	-	-	-	-	-	-	7	-	-	7	-	7
Available-for-sale financial instruments	-	-	-	-	-	-	1	-	-	1	-	1
Translation adjustments	-	-	-	-	195	-	(93)	2,387	102	2,591	117	2,708

The accompanying notes are an integral part of these financial statements.





**Consolidated Statement of Changes in Equity (Continued)**  
In millions of United States dollars

	Share capital	Results on conversion of shares	Capital reserve	Results from operation with noncontrolling interest	Profit reserves	Treasury stocks	Unrealized fair value gain (losses)	Cumulative translation adjustments	Retained earnings	Equity attributable to Vale's stockholders	Equity attributable to noncontrolling interests	Total stockholders' equity
<b>Transactions with stockholders:</b>												
Dividends and interest on capital of Vale's stockholders	-	-	-	-	-	-	-	-	(1,061)	(1,061)	-	(1,061)
Dividends of noncontrolling interest	-	-	-	-	-	-	-	-	-	-	(268)	(268)
Acquisitions and disposal of noncontrolling interest (note 15)	-	-	-	3	-	-	-	-	-	3	(1)	2
Capitalization of noncontrolling interest advances	-	-	-	-	-	-	-	-	-	-	25	25
Appropriation to undistributed retained earnings	-	-	-	-	3,023	-	-	-	(3,023)	-	-	-
<b>Balance at December 31, 2016</b>	<b>61,614</b>	<b>(152)</b>	<b>-</b>	<b>(699)</b>	<b>4,203</b>	<b>(1,477)</b>	<b>(1,147)</b>	<b>(23,300)</b>	<b>-</b>	<b>39,042</b>	<b>1,982</b>	<b>41,024</b>
<b>Net income</b>	-	-	-	-	-	-	-	-	5,507	5,507	14	5,521
<b>Other comprehensive income:</b>												
Retirement benefit obligations	-	-	-	-	-	-	(46)	-	-	(46)	-	(46)
Net investments hedge (note 24b)	-	-	-	-	-	-	-	(95)	-	(95)	-	(95)
Translation adjustments	-	-	-	-	(158)	-	10	447	-	299	(1)	298
<b>Transactions with stockholders:</b>												
Dividends and interest on capital of Vale's stockholders	-	-	-	-	(658)	-	-	-	(1,475)	(2,133)	-	(2,133)
Dividends of noncontrolling interest	-	-	-	-	-	-	-	-	-	-	(202)	(202)
Acquisitions and disposal of noncontrolling interest (note 15)	-	-	-	(255)	-	-	-	-	-	(255)	(512)	(767)
Capitalization of noncontrolling interest advances	-	-	-	-	-	-	-	-	-	-	33	33
Appropriation to undistributed retained earnings	-	-	-	-	4,032	-	-	-	(4,032)	-	-	-
Merger of Valepar (note 29)	-	-	1,139	-	-	-	-	-	-	1,139	-	1,139
<b>Balance at December 31, 2017</b>	<b>61,614</b>	<b>(152)</b>	<b>1,139</b>	<b>(954)</b>	<b>7,419</b>	<b>(1,477)</b>	<b>(1,183)</b>	<b>(22,948)</b>	<b>-</b>	<b>43,458</b>	<b>1,314</b>	<b>44,772</b>

The accompanying notes are an integral part of these financial statements.





## Notes to the Financial Statements

Expressed in millions of United States dollar, unless otherwise stated

### 1. Corporate information

Vale S.A. (the "Parent Company") is a public company headquartered in the city of Rio de Janeiro, Brazil with securities traded on the stock exchanges of São Paulo—B3 S.A. (Vale3), New York—NYSE (VALE), Paris—NYSE Euronext (Vale3) and Madrid—LATIBEX (XVALO).

Vale S.A. and its direct and indirect subsidiaries ("Vale" or "Company") are global producers of iron ore and iron ore pellets, key raw materials for steelmaking, and producers of nickel, which is used to produce stainless steel and metal alloys employed in the production of several products. The Company also produces copper, metallurgical and thermal coal, manganese ore, ferroalloys, platinum group metals, gold, silver and cobalt. The information by segment is presented in note 3.

On December 22, 2017 after the conversion of the class "A" preferred shares into common shares, the Company migrated to the special listing segment of B3 S.A. ("*Novo Mercado*"), and became a company with no defined controlling shareholder (further details in the notes 4 and 29). As of this date, Vale's common shares are traded in the *Novo Mercado*.

### 2. Basis for preparation of the financial statements

#### a) Statement of compliance

The consolidated financial statements of the Company ("financial statements") have been prepared and are being presented in accordance with the International Financial Reporting Standards ("IFRS") as issued by the International Accounting Standards Board ("IASB").

#### b) Basis of presentation

The financial statements have been prepared under the historical cost convention as adjusted to reflect: (i) the fair value of financial instruments measured at fair value through income statement or available-for-sale financial instruments measured at fair value through the statement of comprehensive income; and (ii) impairment of assets.

The issue of these financial statements was authorized by the Board of Directors on February 27, 2018.

#### c) Consolidation and investments in associates and joint ventures

The financial statements reflect the assets, liabilities and transactions of the Parent Company and its direct and indirect controlled entities ("subsidiaries"). These subsidiaries are consolidated when the Company is exposed or has rights to variable returns from its involvement with the investee and has the ability to direct the significant activities of the investee. The Company also consolidates subsidiaries that Vale does not own the majority of the voting capital, but has control through other means, such as a stockholder's agreement. Intercompany balances and transactions, which include unrealized profits, are eliminated.

The entities over which the Company has joint control ("joint ventures") or significant influence, but not control ("associates") are presented in note 15. Those investments are accounted for using the equity



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**2. Basis for preparation of the financial statements (Continued)**

method. For interests in joint arrangements not classified as joint ventures (“joint operations”), the Company recognizes its share of assets, liabilities and net income.

Unrealized gains on downstream or upstream transactions between the Company and its associates and joint ventures are eliminated fully or proportionately to the Company’s interest.

The material consolidated entities in each business segment are as follows:

	Location	Main activity/Business	% Ownership	% Voting capital	% Noncontrolling interest
<b>Direct and indirect subsidiaries</b>					
Companhia Portuária da Baía de Sepetiba .....	Brazil	Iron ore	100.0%	100.0%	0.0%
Mineração Corumbaense Reunida S.A. . .	Brazil	Iron ore and manganese	100.0%	100.0%	0.0%
Minerações Brasileiras Reunidas S.A. (“MBR”) .....	Brazil	Iron ore	62.5%	98.3%	37.5%
Salobo Metais S.A. ....	Brazil	Copper	100.0%	100.0%	0.0%
PT Vale Indonesia .....	Indonesia	Nickel	59.2%	59.2%	40.8%
Vale International Holdings GmbH.....	Austria	Holding and research	100.0%	100.0%	0.0%
Vale Canada Limited .....	Canada	Nickel	100.0%	100.0%	0.0%
Vale International S.A. ....	Switzerland	Trading and holding	100.0%	100.0%	0.0%
Vale Malaysia Minerals Sdn. Bhd. ....	Malaysia	Iron ore	100.0%	100.0%	0.0%
Vale Manganês S.A. ....	Brazil	Manganese and ferroalloys	100.0%	100.0%	0.0%
Vale Moçambique S.A. ....	Mozambique	Coal	81.0%	81.0%	19.0%
Vale Nouvelle Calédonie S.A.S. ....	New Caledonia	Nickel	95.0%	95.0%	5.0%
Vale Oman Distribution Center LLC.....	Oman	Iron ore and pelletizing	100.0%	100.0%	0.0%
Vale Oman Pelletizing Company LLC ...	Oman	Pelletizing	70.0%	70.0%	30.0%

Investments held by investors in Vale’s subsidiaries are classified as noncontrolling interests. The Company treats transactions with noncontrolling interests as transactions with equity owners of the Company as described in note 16.

For purchases from noncontrolling interests, the difference between any consideration paid and the proportion acquired of the carrying value of net assets of the subsidiary is recorded in stockholders’ equity. Gains or losses on disposals to noncontrolling interest are also directly recorded in stockholders’ equity in “Results from operation with noncontrolling interest”.

As explained in note 14, the Fertilizer Segment is presented as discontinued operations, which includes the following subsidiaries:

	Location	Main activity/Business	% Ownership	% Voting capital	% Noncontrolling interest
<b>Direct and indirect subsidiaries</b>					
Compañía Minera Miski Mayo S.A.C. ....	Peru	Fertilizers	40.0%	51.0%	60.0%
Vale Fertilizantes S.A. ....	Brazil	Fertilizers	100.0%	100.0%	0.0%
Vale Cubatão Fertilizantes Ltda. ....	Brazil	Fertilizers	100.0%	100.0%	0.0%

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**2. Basis for preparation of the financial statements (Continued)**

**d) Functional currency and presentation currency**

The financial statements of the Company and its associates and joint ventures are measured using the currency of the primary economic environment in which the entity operates (“functional currency”), which in the case of the Parent Company is the Brazilian real (“R\$”). For presentation purposes, these financial statements are presented in United States dollar (“US\$”) as the Company believes that this is how international investors analyze the financial statements.

Transactions in foreign currencies are translated into the functional currency using the exchange rate prevailing at the transaction date. The foreign exchange gains and losses resulting from the translation at the exchange rates prevailing at the end of the year are recognized in the income statement as “financial income or expense”. The exceptions are transactions for which gains and losses are recognized in the statement of comprehensive income.

The income statement and statement of financial position of the subsidiaries for which the functional currency is different from the presentation currency are translated into the presentation currency as follows: (i) assets, liabilities and stockholders’ equity, except for the components described in item (iii) are translated at the closing rate at the statement of financial position date; (ii) income and expenses are translated at the average exchange rates, except for specific significant transactions that, are translated at the rate at the transaction date and; (iii) capital, capital reserves and treasury stock are translated at the rate at each transaction date. All resulting exchange differences are recognized directly in the comprehensive income as “translation adjustments”. When a foreign operation is partially disposed of or sold, foreign exchanges differences that were recognized in equity are recognized in the income of statement.

The exchange rates used by the Company to translate its foreign operations are as follows:

	Closing rate			Average rate for the year ended		
	2017	2016	2015	2017	2016	2015
US Dollar (“US\$”).....	3.3080	3.2591	3.9048	3.1925	3.4833	3.3387
Canadian dollar (“CAD”) .....	2.6344	2.4258	2.8171	2.4618	2.6280	2.6020
Australian dollar (“AUD”) .....	2.5849	2.3560	2.8532	2.4474	2.5876	2.4979
Euro (“EUR” or “€”) .....	3.9693	3.4384	4.2504	3.6088	3.8543	3.6999

**e) Significant accounting policies**

Significant and relevant accounting policies for the understanding of the recognition and measurement basis used on the preparation of these financial statements were included in the respective notes. The accounting policies applied in the preparation of these financial statements are consistent with those adopted and disclosed in the financial statements of prior years.

The Company has not early adopted any standards and interpretations that have been issued or amended but are not yet effective for the year ended December 31, 2017.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**2. Basis for preparation of the financial statements (Continued)**

The following new accounting standards were issued by IASB, but are not yet effective for 2017. The Company has performed an assessment on the Company's financial statements and the current expected impacts are detailed below:

- **IFRS 9 Financial instrument**—In July 2014, the IASB issued the final version of IFRS 9 that replaces IAS 39 Financial Instruments: Recognition and Measurement. This standard addresses the classification and measurement of financial assets and liabilities, new impairment model and new rules for hedge accounting. This standard shall apply for annual periods beginning on or after January 1, 2018. The Company has reviewed its financial assets and liabilities and is expecting the following impact from the adoption of the new standard on 1 January 2018:
  - Classification and measurement—IFRS 9 establishes a new approach to determine whether a financial asset should be measured at amortized cost or fair value, based on the cash flow characteristics and the business model in which an asset is held. The Company does not currently expect the impact of these changes to be significant.
  - Impairment—IFRS 9 requires “expected credit loss” impairment model for accounts receivables measured at amortized cost, on either a 12-month or the lifetime basis, rather than only incurred credit losses as is the case under IAS 39. Given that Vale's account receivables are short-term in nature and considering its credit rating and risk management policies in place, the Company does not expect these changes will have a significant impact on its financial statements.
  - Hedge accounting—the changes in IFRS 9 relating to hedge accounting will have no impact as the Company does not currently apply cash flow or fair value hedge accounting. The Company currently applies the net investment hedge, which there is no changes introduced by this new standard.
- **IFRS 15 Revenue from Contracts with Customers**—In May 2014, the IASB issued IFRS 15, which replaces IAS 18 Revenues and the related interpretations. IFRS 15 introduces the five-step model for revenue recognition from contracts with customers. The new standard is based on the core principle that revenue is recognized when the control of a good or service transfers to a customer of an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. This standard shall apply for annual periods beginning on or after January 1, 2018.

The Company will adopt this new standard on the required effective date using the modified retrospective method. Accordingly, the Company will not be required to restate the comparative figures.

## Notes to the Financial Statements (Continued)

Expressed in millions of United States dollar, unless otherwise stated

### 2. Basis for preparation of the financial statements (Continued)

During 2017, the Company performed a detailed assessment of IFRS 15, based on the contractual arrangements across the Company's main revenue streams. The result of this assessment and the impacts identified in relation to the IFRS 15 first adoption are summarized as follows:

Vale's revenue is predominantly derived from commodities sales, where the point of recognition is dependent on the sales arrangement, which is governed by parameters established by the International Commercial Terms (Incoterms). There will be no significant impact on the timing of commodities revenue recognition under IFRS 15, since usually the transfer of risks and rewards and the transfer of control under the sales contracts are at the same point in time.

However, a significant proportion of Vale's sales are under CFR (Cost and Freight) or CIF (Cost, Insurance and Freight) Incoterms, in which the Company is responsible for providing shipping services after the date that Vale transfers control of the goods to the customers. Currently, the revenue from shipping services are recognized upon loading, as well as the related costs, and are not considered a separate service under IAS 18.

Under IFRS 15, the provision of shipping services for CFR and CIF contracts will be a distinct service and, therefore, a separate performance obligation to which a proportion of the transaction price should be allocated and recognized over time as the shipping services are provided. The impact on the timing of revenue recognition of the proportion allocated to the shipping service is deemed not significant to the Company's year-end results. Therefore, such revenue will not be presented separately in the Company's financial statements.

The accounting treatment for contracts with provisional pricing features that are currently considered as an embedded derivative in accordance with IAS 39—Financial Instruments, shall remain unmodified in accordance with IFRS 15 and IFRS 9—Financial Instruments. In addition, IFRS 15 introduces a new disclosure requirement for the provisional prices impact on the financial statements. When applicable, systems and processes will be amended to allow the disclosure of this information in the Company's financial statements.

IFRS 15 also requires the Company to treat deferred revenue related to the gold stream transaction as variable and, therefore must be adjusted each time there is a change in the underlying production profile. The Company does not expect to record a significant adjustment upon transition to this new standard.

- **IFRS 16 Lease**—In January 2016, the IASB issued IFRS 16, which replaces IAS 17 Leases and related interpretations. The IFRS 16 set forth that the lessee must recognize all leases on the statement of financial position, as the distinction between operating and finance leases is removed. The standard provides certain exemptions from recognizing leases on the statement of financial position, including where the underlying asset is of low value or the lease term is 12 months or less. Under the new standard, the Company will be required to recognize right of use lease assets and lease liabilities on the statement of financial position. Liabilities are measured based on the present value of future lease payments over the lease term. The right of use lease asset generally reflects the lease liability. This standard shall apply for annual periods beginning on or after January 1, 2019.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**2. Basis for preparation of the financial statements (Continued)**

The Company has commenced the qualitative analysis of its main contracts and will continue to assess the quantitative potential effect of IFRS 16 during 2018, which depends on the decision regarding the transition method and the use of practical expedients and/or exemptions. It is therefore not yet possible to estimate the amount of right-of-use assets and lease liabilities that will have to be recognised on adoption of the new standard and how this may affect the Company's income statement.

The information on the main operating leases is presented in note 31.

**f) Critical accounting estimates and judgments**

The preparation of financial statements requires the use of certain critical accounting estimates and the application of judgment by management in applying the Company's accounting policies. These estimates are based on the experience, best knowledge, information available at the statement of financial position date and other factors, including expectations of future events that are believed to be reasonable under the circumstances. Changes in facts and circumstances may lead to the revision of these estimates. Actual future results may differ from the estimates.

The significant estimates and judgments applied by Company in the preparation of these financial statements are as follows:

Note	Significant estimates and judgments
7	Deferred revenue—Gold stream transaction
8	Deferred income taxes
15	Consolidation
18	Mineral reserves and mine useful life
19	Impairment of non-current assets
21	Liabilities related to associates and joint ventures
23	Fair values estimate
26	Asset retirement obligation
27	Litigation
28	Employee postretirement obligations

**3. Information by business segment and by geographic area**

The Company operated five reportable segments during this year: Ferrous Minerals, Coal, Base Metals, Fertilizers (presented as discontinued operations) and Others. The segments are aligned with products and reflect the structure used by Management to evaluate Company performance. The responsible bodies for making operational decisions, allocating resources and evaluating performance are the Executive Boards and the Board of Directors. The performance of the operating segments is assessed based on a measure of adjusted EBITDA.

The information presented to the Executive Board on the performance of each segment is derived from the accounting records, adjusted for reallocations between segments.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**3. Information by business segment and by geographic area (Continued)**

The main activities of the operating segments are as follows:

**Ferrous minerals**—Ferrous minerals comprises the production and extraction of iron ore, iron ore pellets and its logistic services (railroads, ports and terminals), manganese, ferroalloys and others ferrous products and services.

**Coal**—Coal comprises the extraction of metallurgical and thermal coal and its logistic services (railroads, ports and terminals).

**Base metals**—Base metals include the production and extraction of non-ferrous minerals, and are presented as nickel and its by-products (ferro-nickel, copper, gold, precious metals and others) and copper (copper concentrated).

**Fertilizers (Discontinued operations)**—Fertilizers include the production of the three major groups of nutrients (potash, phosphate and nitrogen) and other fertilizers products. The group of assets related to this segment is classified as "Non-current assets and liabilities associated with non-current assets held for sale" (note 14).

**Others**—Other comprises sales and expenses of other products, services, research and evaluation, investments in joint ventures and associates of other business and contingencies not directly related to the core business.

**a) Adjusted EBITDA**

The definition of adjusted EBITDA for the Company is the operating income or loss excluding (i) the depreciation, depletion and amortization, (ii) results on measurement or sales of non-current assets,

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**3. Information by business segment and by geographic area (Continued)**

(iii) impairment, (iv) onerous contracts and plus (v) dividends received and interest from associates and joint ventures.

	Year ended December 31, 2017						
	Net operating revenue	Cost of goods sold and services rendered	Sales, administrative and other operating expenses	Research and evaluation	Pre operating and operational stoppage	Dividends received and interest from associates and joint ventures	Adjusted EBITDA
<b>Ferrous minerals</b>							
Iron ore .....	18,524	(7,950)	(284)	(88)	(181)	30	10,051
Iron ore Pellets .....	5,653	(2,876)	(65)	(19)	(7)	81	2,767
Ferroalloys and manganese .....	469	(278)	(12)	-	(4)	-	175
Other ferrous products and services .....	483	(306)	5	(2)	-	19	199
	<b>25,129</b>	<b>(11,410)</b>	<b>(356)</b>	<b>(109)</b>	<b>(192)</b>	<b>130</b>	<b>13,192</b>
<b>Coal .....</b>	<b>1,567</b>	<b>(1,354)</b>	<b>(44)</b>	<b>(14)</b>	<b>(4)</b>	<b>179</b>	<b>330</b>
<b>Base metals</b>							
Nickel and other products .....	4,667	(3,437)	(152)	(49)	(75)	-	954
Copper .....	2,204	(979)	(27)	(13)	-	-	1,185
	<b>6,871</b>	<b>(4,416)</b>	<b>(179)</b>	<b>(62)</b>	<b>(75)</b>	<b>-</b>	<b>2,139</b>
<b>Others.....</b>	<b>400</b>	<b>(375)</b>	<b>(281)</b>	<b>(155)</b>	<b>(9)</b>	<b>97</b>	<b>(323)</b>
<b>Total of continuing operations ...</b>	<b>33,967</b>	<b>(17,555)</b>	<b>(860)</b>	<b>(340)</b>	<b>(280)</b>	<b>406</b>	<b>15,338</b>
<b>Discontinued operations</b>							
(Fertilizers) .....	1,746	(1,606)	(102)	(12)	(25)	3	4
<b>Total .....</b>	<b>35,713</b>	<b>(19,161)</b>	<b>(962)</b>	<b>(352)</b>	<b>(305)</b>	<b>409</b>	<b>15,342</b>



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**3. Information by business segment and by geographic area (Continued)**

	Year ended December 31, 2016						
	Net operating revenue	Cost of goods sold and services rendered	Sales, administrative and other operating expenses	Research and evaluation	Pre operating and operational stoppage	Dividends received and interest from associates and joint ventures	Adjusted EBITDA
<b>Ferrous minerals</b>							
Iron ore .....	15,784	(6,622)	(486)	(91)	(150)	10	8,445
Iron ore Pellets .....	3,827	(2,002)	(73)	(13)	(22)	103	1,820
Ferroalloys and manganese .....	302	(231)	(4)	-	(11)	-	56
Other ferrous products and services .....	438	(269)	(8)	(2)	(4)	-	155
	<b>20,351</b>	<b>(9,124)</b>	<b>(571)</b>	<b>(106)</b>	<b>(187)</b>	<b>113</b>	<b>10,476</b>
<b>Coal</b> .....	<b>839</b>	<b>(872)</b>	<b>35</b>	<b>(15)</b>	<b>(41)</b>	<b>-</b>	<b>(54)</b>
<b>Base metals</b>							
Nickel and other products .....	4,472	(3,204)	(95)	(78)	(114)	4	985
Copper .....	1,667	(924)	(25)	(5)	-	-	713
Other base metals products .....	-	-	150	-	-	-	150
	<b>6,139</b>	<b>(4,128)</b>	<b>30</b>	<b>(83)</b>	<b>(114)</b>	<b>4</b>	<b>1,848</b>
<b>Others</b> .....	<b>159</b>	<b>(259)</b>	<b>(157)</b>	<b>(116)</b>	<b>(1)</b>	<b>76</b>	<b>(298)</b>
<b>Total of continuing operations</b> ...	<b>27,488</b>	<b>(14,383)</b>	<b>(663)</b>	<b>(320)</b>	<b>(343)</b>	<b>193</b>	<b>11,972</b>
<b>Discontinued operations</b>							
(Fertilizers) .....	1,875	(1,545)	(87)	(22)	(16)	4	209
<b>Total</b> .....	<b>29,363</b>	<b>(15,928)</b>	<b>(750)</b>	<b>(342)</b>	<b>(359)</b>	<b>197</b>	<b>12,181</b>



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**3. Information by business segment and by geographic area (Continued)**

	Year ended December 31, 2015						
	Net operating revenue	Cost of goods sold and services rendered	Sales, administrative and other operating expenses	Research and evaluation	Pre operating and operational stoppage	Dividends received and interest from associates and joint ventures	Adjusted EBITDA
<b>Ferrous minerals</b>							
Iron ore .....	12,330	(7,604)	(398)	(121)	(124)	22	4,105
Iron ore Pellets .....	3,600	(2,121)	9	(4)	(24)	225	1,685
Ferroalloys and manganese .....	162	(175)	1	-	(19)	-	(31)
Other ferrous products and services .....	470	(341)	8	(3)	(2)	8	140
	<u>16,562</u>	<u>(10,241)</u>	<u>(380)</u>	<u>(128)</u>	<u>(169)</u>	<u>255</u>	<u>5,899</u>
<b>Coal .....</b>	<b>526</b>	<b>(839)</b>	<b>(140)</b>	<b>(22)</b>	<b>(61)</b>	<b>28</b>	<b>(508)</b>
<b>Base metals</b>							
Nickel and other products .....	4,693	(3,393)	(154)	(103)	(411)	-	632
Copper .....	1,470	(903)	(32)	(8)	(1)	-	526
Other base metals products .....	-	-	230	-	-	-	230
	<u>6,163</u>	<u>(4,296)</u>	<u>44</u>	<u>(111)</u>	<u>(412)</u>	<u>-</u>	<u>1,388</u>
<b>Others .....</b>	<b>133</b>	<b>(139)</b>	<b>(160)</b>	<b>(134)</b>	<b>-</b>	<b>35</b>	<b>(265)</b>
<b>Total of continuing operations ...</b>	<b><u>23,384</u></b>	<b><u>(15,515)</u></b>	<b><u>(636)</u></b>	<b><u>(395)</u></b>	<b><u>(642)</u></b>	<b><u>318</u></b>	<b><u>6,514</u></b>
<b>Discontinued operations</b>							
(Fertilizers) .....	2,225	(1,469)	(37)	(82)	(70)	-	567
<b>Total .....</b>	<b><u>25,609</u></b>	<b><u>(16,984)</u></b>	<b><u>(673)</u></b>	<b><u>(477)</u></b>	<b><u>(712)</u></b>	<b><u>318</u></b>	<b><u>7,081</u></b>

Adjusted EBITDA is reconciled to net income (loss) as follows:

**From Continuing operations**

	Year ended December 31		
	2017	2016	2015
<b>Adjusted EBITDA from continuing operations .....</b>	<b><u>15,338</u></b>	<b><u>11,972</u></b>	<b><u>6,514</u></b>
Depreciation, depletion and amortization .....	(3,708)	(3,487)	(3,719)
Dividends received and interest from associates and joint ventures .....	(406)	(193)	(318)
Impairment and other results on non-current assets .....	(294)	(1,240)	(8,708)
<b>Operating income (loss) .....</b>	<b><u>10,930</u></b>	<b><u>7,052</u></b>	<b><u>(6,231)</u></b>
Financial results, net .....	(3,019)	1,843	(10,654)
Equity results in associates and joint ventures .....	98	309	(445)
Impairment and other results in associates and joint ventures .....	(180)	(1,220)	(349)
Income taxes .....	(1,495)	(2,781)	5,249
<b>Net income (loss) from continuing operations .....</b>	<b><u>6,334</u></b>	<b><u>5,203</u></b>	<b><u>(12,430)</u></b>
Net income (loss) attributable to noncontrolling interests .....	21	(8)	(501)
<b>Net income (loss) attributable to Vale's stockholders .....</b>	<b><u>6,313</u></b>	<b><u>5,211</u></b>	<b><u>(11,929)</u></b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**3. Information by business segment and by geographic area (Continued)**

**From Discontinued operations**

	Year ended December 31		
	2017	2016	2015
Adjusted EBITDA from discontinued operations .....	4	209	567
Depreciation, depletion and amortization .....	(1)	(347)	(310)
Dividends received and interest from associates and joint ventures .....	(3)	(4)	-
Impairment of non-current assets .....	(885)	(1,738)	(157)
<b>Operating income (loss) .....</b>	<b>(885)</b>	<b>(1,880)</b>	<b>100</b>
Financial results, net .....	(28)	20	(147)
Equity results in associates and joint ventures .....	(2)	3	6
Income taxes .....	102	630	(149)
<b>Loss from discontinued operations .....</b>	<b>(813)</b>	<b>(1,227)</b>	<b>(190)</b>
Net income (loss) attributable to noncontrolling interests .....	(7)	2	10
<b>Loss attributable to Vale's stockholders .....</b>	<b>(806)</b>	<b>(1,229)</b>	<b>(200)</b>

**b) Assets by segment**

	Year ended December 31, 2017				
	Product inventory	Investments in associates and joint ventures	Property, plant and equipment and intangible(i)	Additions to property, plant and equipment and intangible(ii)	Depreciation, depletion and amortization(iii)
Ferrous minerals .....	1,770	1,922	36,103	2,679	1,767
Coal .....	82	317	1,719	118	297
Base metals .....	1,009	13	23,603	1,010	1,614
Others .....	6	1,316	1,946	24	30
<b>Total .....</b>	<b>2,867</b>	<b>3,568</b>	<b>63,371</b>	<b>3,831</b>	<b>3,708</b>

	Year ended December 31, 2016				
	Product inventory	Investments in associates and joint ventures	Property, plant and equipment and intangible(i)	Additions to property, plant and equipment and intangible(ii)	Depreciation, depletion and amortization(iii)
Ferrous minerals .....	1,134	1,808	34,834	3,246	1,618
Coal .....	126	285	1,907	612	191
Base metals .....	1,110	12	23,372	1,057	1,658
Others .....	3	1,591	2,177	36	20
<b>Total .....</b>	<b>2,373</b>	<b>3,696</b>	<b>62,290</b>	<b>4,951</b>	<b>3,487</b>

- (i) Goodwill is allocated mainly in ferrous minerals and base metals segments in the amount of US\$2,157 and US\$1,953 in December 31, 2017 and US\$1,246 and US\$1,835 in December 31, 2016, respectively.
- (ii) Includes only cash effect.
- (iii) Refers to amounts recognized in the income statement.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**3. Information by business segment and by geographic area (Continued)**

**c) Investment in associates and joint ventures, intangible and property, plant and equipment by geographic area**

	December 31, 2017				December 31, 2016			
	Investments in associates and joint ventures	Intangible	Property, plant and equipment	Total	Investments in associates and joint ventures	Intangible	Property, plant and equipment	Total
Brazil.....	2,993	6,231	33,782	43,006	3,172	4,720	34,509	42,401
Canada .....	-	2,118	10,967	13,085	-	2,002	10,267	12,269
Americas, except Brazil and Canada .....	200	-	427	627	185	-	30	215
Europe .....	-	-	394	394	-	-	639	639
Indonesia .....	-	-	2,787	2,787	-	-	2,972	2,972
Asia, except Indonesia .....	372	-	1,100	1,472	339	-	1,201	1,540
Australia .....	-	-	45	45	-	-	43	43
New Caledonia .....	-	-	2,965	2,965	-	-	3,087	3,087
Mozambique .....	-	143	1,532	1,675	-	149	1,715	1,864
Oman .....	-	1	868	869	-	-	956	956
Other regions .....	3	-	11	14	-	-	-	-
<b>Total .....</b>	<b>3,568</b>	<b>8,493</b>	<b>54,878</b>	<b>66,939</b>	<b>3,696</b>	<b>6,871</b>	<b>55,419</b>	<b>65,986</b>

**d) Net operating revenue by geographic area**

	Year ended December 31, 2017				
	Ferrous minerals	Coal	Base metals	Others	Total
Americas, except United States and Brazil .....	593	-	1,009	70	1,672
United States of America .....	355	-	872	83	1,310
Germany .....	1,097	-	292	-	1,389
Europe, except Germany .....	1,721	396	1,985	11	4,113
Middle East/Africa/Oceania .....	1,768	171	13	-	1,952
Japan .....	1,927	130	399	-	2,456
China .....	13,442	-	576	-	14,018
Asia, except Japan and China .....	1,332	711	1,539	-	3,582
Brazil .....	2,894	159	186	236	3,475
<b>Net operating revenue .....</b>	<b>25,129</b>	<b>1,567</b>	<b>6,871</b>	<b>400</b>	<b>33,967</b>

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**3. Information by business segment and by geographic area (Continued)**

	Year ended December 31, 2016				
	Ferrous minerals	Coal	Base metals	Others	Total
Americas, except United States and Brazil .....	334	20	1,172	-	1,526
United States of America .....	232	-	749	24	1,005
Germany .....	1,077	-	302	-	1,379
Europe, except Germany .....	1,482	218	1,552	17	3,269
Middle East/Africa/Oceania .....	1,252	95	20	-	1,367
Japan .....	1,292	121	328	-	1,741
China .....	11,985	63	699	-	12,747
Asia, except Japan and China .....	912	305	1,173	-	2,390
Brazil .....	1,785	17	144	118	2,064
<b>Net operating revenue .....</b>	<b>20,351</b>	<b>839</b>	<b>6,139</b>	<b>159</b>	<b>27,488</b>

	Year ended December 31, 2015				
	Ferrous minerals	Coal	Base metals	Others	Total
Americas, except United States and Brazil .....	359	18	1,122	-	1,499
United States of America .....	30	-	804	21	855
Germany .....	1,042	-	391	-	1,433
Europe, except Germany .....	1,464	102	1,530	-	3,096
Middle East/Africa/Oceania .....	1,009	97	84	-	1,190
Japan .....	1,512	74	373	-	1,959
China .....	8,400	44	651	-	9,095
Asia, except Japan and China .....	1,081	169	990	-	2,240
Brazil .....	1,665	22	218	112	2,017
<b>Net operating revenue .....</b>	<b>16,562</b>	<b>526</b>	<b>6,163</b>	<b>133</b>	<b>23,384</b>

**Accounting policy**

Revenue is recognized when Vale transfers to its customers all of the significant risks and rewards of ownership of the product sold or when the services are rendered. Net revenue excludes any applicable sales taxes and is recognized at the fair value of the consideration received or receivable to the extent that it is probable that economic benefits will flow to Vale and the revenues can be reliably measured.

Depending on the contract, revenue sales can be recognized when the product is available at the loading port, loaded on the ship, at the port of discharge or at the customer's warehouse. Service revenues are recognized in the amount by which the services are rendered and accepted by the customer.

In some cases, the sale price is determined on a provisional basis at the date of sale and adjustments to the sales price subsequently occur based on movements in the quoted market or contractual prices up to the date of final pricing. Revenue is recognized based on the estimated fair value of the total consideration receivable, and the provisionally priced sales mechanism embedded within these sale arrangements has the character of a derivative. Accordingly, the fair value of the final sales price adjustment is re-estimated continuously and changes in fair value are recognized as operational revenue in the income statement.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**3. Information by business segment and by geographic area (Continued)**

Amounts billed to customers for shipping related to products sold by the Company are recognized as revenue when the Company is responsible for shipping. Shipping costs are recognized as operating costs.

**Commodity price risk**—The commodity price risk arises from volatility of iron ore, nickel, copper and coal prices. The Company is mostly exposed to the fluctuations in the iron ore and copper price. The selling price these products can be measured reliably at each period, since the price is quoted on an active market.

As of December 31, 2017, the Company had 33 million tons (2016: 36 million tons) provisionally priced based on iron ore forward prices and 106 thousand tons (2016: 116 thousand tons) provisionally priced based on copper forward prices. The final price of these sales will be determined during the first quarter of 2018. A 10% change in the price of iron ore realized on the provisionally priced sales, all other factors held constant, would increase or reduce net income by US\$227. A 10% change in the price of copper realized on the provisionally priced sales, all other factors held constant, would increase or reduce net income by US\$86.

**4. Special events occurred during the year**

The special events occurred during the year are those that, in the Company's judgment, have significant effect on: (i) its operations; and/or (ii) corporate governance structure; and/or (iii) the income statement due to their size and nature. To determine whether an event or transaction should be disclosed as "special events", the Company considers quantitative and qualitative factors, such as frequency and magnitude.

The special events identified by the Company are as follows:

**a) Vale's corporate governance restructuring**

At the General Extraordinary Shareholders' Meeting, held on June 27, 2017, shareholders approved the corporate restructuring of the Company proposed by Valepar S.A. (former controlling shareholder). The corporate restructuring was based on (i) conversion of Vale class "A" preferred shares into common shares; (ii) amendment of Vale's by-laws, so as to adjust to *Novo Mercado* rules; and (iii) the merger of Valepar S.A. into Vale.

The transaction was concluded on November 21, 2017 and the restructuring was approved at the General Extraordinary Shareholder's Meeting on December 21, 2017. Further details are disclosed in note 29.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**4. Special events occurred during the year (Continued)**

**b) Events with significant effect on the income statement**

	Year ended December 31		
	2017	2016	2015
Nacala Logistic Corridor .....	458	-	-
Samarco Provision .....	(180)	(1,109)	-
Impairment of non-current assets—Fertilizers business .....	(885)	(1,738)	-
Impairment of non-current assets and onerous contracts .....	(271)	(1,174)	(8,769)
Gold stream transaction .....	-	150	230
Deferred income tax in foreign jurisdiction .....	-	-	2,952
<b>Total</b> .....	<b>(878)</b>	<b>(3,871)</b>	<b>(5,587)</b>

**Nacala Logistic Corridor**—In March 2017, the Company concluded the transaction with Mitsui to sell 15% of its stake in Vale Moçambique and 50% of its stake in the Nacala Logistics Corridor and recognized a gain in the income statement of US\$458. Further details are disclosed in note 15.

**Samarco**—In 2017, the Company recognized in the income statement the amount of US\$38 (2016: US\$1,038 (R\$3,733 million)) in respect of the addition to the provision to comply with the reparation and compensation programs related to the dam failure of Samarco Mineração S.A. The Company also expensed an amount of US\$142 (2016: US\$71) applied by Samarco to funds its working capital requirements. Further details are disclosed in note 21.

**Fertilizers**—In December 2016, the Company approved the sale of fertilizers assets and the acquisition of a noncontrolling interest in The Mosaic Company (“Mosaic”). The Company assessed the fair value less cost of sell of the fertilizer business segment and an impairment loss of US\$1,738 was recognized in the income statement from discontinued operations in the year ended December 31, 2016. In January 2018 (subsequent event), the Company and Mosaic concluded the transaction, which was preceded by final adjustments agreed by the parties under the original terms and conditions of the negotiation. As consequence of these adjustments, an impairment loss of US\$729 was recognized in the income statement from discontinued operations in December 2017. Additionally, in November 2017, the Company entered into an agreement with Yara International ASA to sell its nitrogen assets located in Cubatão, Brazil and an impairment loss of US\$156 was recognized in the income statement from discontinued operations in the year ended December 31, 2017. Further details are disclosed in note 14.

**Impairment of non-current assets and onerous contracts**—In 2017, the Company placed an underground mine in Sudbury in “care and maintenance” and an impairment of US\$133 was recognized in the income statement. In 2016, the Company recognized an impairment loss of US\$1,174 mainly by the reduction in the nickel price projections. In 2015, the Company recognized an impairment loss of US\$8,769 mainly by: (i) the reduction in estimated future coal prices combined with the increase of logistics costs and (ii) the reduction the recoverable values of the VNL and VNC CGUs. Further details are disclosed in note 19.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**4. Special events occurred during the year (Continued)**

**Gold stream transaction**—In March 2015 and August 2016, a gold transaction with Wheaton Precious Metals Corp. (“WPW”) entered into 2013, was amended to include in each contract an additional 25% of the gold extracted as by-product of the Salobo copper mine. Furthermore, the Company recognized a gain of the result on sale of mineral rights in the amount of US\$150 and US\$230 in the year ended December 31, 2016 and 2015, respectively, see note 7.

**Deferred income tax**—In 2015, in the first adoption of the Law 12.973, the Company recognized assets deferred income tax related to accumulated losses of subsidiaries abroad in the amount of US\$2,952, see note 8.

**5. Costs and expenses by nature**

**a) Cost of goods sold and services rendered**

	Year ended December 31		
	2017	2016	2015
Personnel .....	2,295	2,087	2,092
Materials and services .....	3,814	3,108	2,954
Fuel oil and gas .....	1,313	1,233	1,207
Maintenance .....	3,096	2,747	2,518
Energy .....	963	694	482
Acquisition of products .....	543	511	829
Depreciation and depletion .....	3,484	3,267	3,236
Freight .....	3,346	2,509	3,496
Others .....	2,185	1,494	1,937
<b>Total</b> .....	<b>21,039</b>	<b>17,650</b>	<b>18,751</b>
Cost of goods sold .....	20,426	17,148	18,233
Cost of services rendered .....	613	502	518
<b>Total</b> .....	<b>21,039</b>	<b>17,650</b>	<b>18,751</b>

**b) Selling and administrative expenses**

	Year ended December 31		
	2017	2016	2015
Personnel .....	234	209	253
Services .....	77	72	106
Depreciation and amortization .....	91	120	131
Travel expenses .....	8	8	11
Taxes and rents .....	12	13	16
Others .....	109	85	95
<b>Total</b> .....	<b>531</b>	<b>507</b>	<b>612</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**5. Costs and expenses by nature (Continued)**

**c) Others operational expenses (incomes), net**

	Year ended December 31		
	2017	2016	2015
Provision for litigation.....	169	137	11
Profit sharing program .....	149	76	15
Disposals (reversals) of materials and inventories .....	17	(23)	55
Others .....	85	77	126
<b>Total .....</b>	<b>420</b>	<b>267</b>	<b>207</b>

**6. Financial result**

	Year ended December 31		
	2017	2016	2015
<b>Financial expenses</b>			
Loans and borrowings gross interest.....	(1,697)	(1,768)	(1,647)
Capitalized loans and borrowing costs.....	370	653	761
Derivative financial instruments .....	(533)	(484)	(3,553)
Indexation and exchange rate variation (a) .....	(2,617)	(2,964)	(13,825)
Participative stockholders' debentures .....	(625)	(417)	965
Expenses of REFIS.....	(397)	(514)	(547)
Others .....	(924)	(631)	(600)
	<b>(6,423)</b>	<b>(6,125)</b>	<b>(18,446)</b>
<b>Financial income</b>			
Short-term investments .....	176	92	140
Derivative financial instruments .....	987	1,740	1,076
Indexation and exchange rate variation (b) .....	1,939	6,058	6,465
Others .....	302	78	111
	<b>3,404</b>	<b>7,968</b>	<b>7,792</b>
<b>Financial results, net .....</b>	<b>(3,019)</b>	<b>1,843</b>	<b>(10,654)</b>
<b>Summary of indexation and exchange rate variation</b>			
Loans and borrowings.....	(257)	5,099	(10,460)
Others .....	(421)	(2,005)	3,100
<b>Net (a) + (b).....</b>	<b>(678)</b>	<b>3,094</b>	<b>(7,360)</b>

As from January 1, 2017, the Company applies net investment hedge accounting in foreign operation. Further details are disclosed in note 24.



**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**7. Deferred revenue—Gold stream transaction**

In 2013, the Company entered into a gold transaction with Wheaton Precious Metals Corp. (“WPM”), and amended in March 2015 and August 2016, to sell 75% of the gold extracted as a by-product of the Salobo copper mine and 70% of the gold extracted as a by-product of Sudbury nickel mines.

The transactions were bifurcated into two identifiable components (i) the sale of the mineral rights and, (ii) the services for gold extraction on the portion in which Vale operates as an agent for WPM gold extraction.

The result on sale of mineral rights from the additional transactions of US\$150 and US\$230 was recognized in the years ended December 31, 2016 and 2015, respectively, under “Other operating expenses, net”.

**Critical accounting estimates and judgments**

Defining the gain on sale of mineral interest and the deferred revenue portion of the transaction requires the use of critical accounting estimates as follows:

- Discount rates used to measure the present value of future inflows and outflows;
- Allocation of costs between nickel or copper and gold based on relative prices;
- Expected margin for the independent elements (sale of mineral rights and service for gold extraction) based on Company’s best estimate.

**8. Income taxes**

**a) Deferred income tax assets and liabilities**

	December 31, 2017	December 31, 2016
<b>Taxes losses carryforward .....</b>	<b>4,471</b>	<b>6,194</b>
<b>Temporary differences:</b>		
Employee post retirement obligations .....	684	620
Provision for litigation .....	457	215
Timing differences arising on assets .....	1,268	1,264
Fair value of financial instruments .....	549	167
Allocated goodwill .....	(2,433)	(2,247)
Others .....	(77)	(570)
	<b>448</b>	<b>(551)</b>
<b>Total .....</b>	<b>4,919</b>	<b>5,643</b>
Assets .....	6,638	7,343
Liabilities .....	(1,719)	(1,700)
	<b>4,919</b>	<b>5,643</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**8. Income taxes (Continued)**

Changes in deferred tax are as follows:

	Assets	Liabilities	Total
<b>Balance at December 31, 2015</b> .....	<b>7,904</b>	<b>1,670</b>	<b>6,234</b>
Taxes losses carryforward .....	(1,391)	–	(1,391)
Timing differences arising on assets .....	298	–	298
Fair value of financial instruments .....	(802)	–	(802)
Allocated goodwill .....	–	(342)	342
Others .....	(285)	–	(285)
<b>Effect in income statement</b> .....	<b>(2,180)</b>	<b>(342)</b>	<b>(1,838)</b>
Transfers between asset and liabilities .....	322	322	–
Translation adjustment .....	900	36	864
Other comprehensive income .....	(19)	14	(33)
<b>Effect of discontinued operations</b>			
Income tax .....	627	–	627
Transfer to net assets held for sale .....	(211)	–	(211)
<b>Balance at December 31, 2016</b> .....	<b>7,343</b>	<b>1,700</b>	<b>5,643</b>
Taxes losses carryforward .....	(2,143)	–	(2,143)
Timing differences arising on assets .....	103	–	103
Fair value of financial instruments .....	388	–	388
Allocated goodwill .....	–	(109)	109
Others .....	897	–	897
<b>Effect in income statement</b> .....	<b>(755)</b>	<b>(109)</b>	<b>(646)</b>
Transfers between asset and liabilities .....	40	40	–
Translation adjustment .....	(24)	75	(99)
Other comprehensive income .....	(68)	13	(81)
<b>Effect of discontinued operations</b>			
Income tax .....	102	–	102
<b>Balance at December 31, 2017</b> .....	<b>6,638</b>	<b>1,719</b>	<b>4,919</b>

**Law 12.973**—The Brazilian corporate tax law was amended at the end of 2014 and became effective as from fiscal year 2015. The change provided that profits from foreign subsidiaries are taxable in Brazil, on an accrual basis, applying the differential between the nominal local tax rate and the Brazilian tax rates (34%) considering the profit before tax in local GAAP (Generally Accepted Accounting Principles) and local currency. Accordingly, from January 1st, 2015 the results from foreign subsidiaries are recognized on that basis.

In accordance with article 77 of law 12.973, the losses generated by the foreign subsidiaries, before income taxes and the equity results, may be offset against their future profits, subject to certain conditions.

In 2015, in the first adoption, the Company recognized deferred income tax assets related to accumulated losses of subsidiaries abroad in the amount of US\$2,952. Based on Company's projections, the deferred tax assets are expected to be utilized up to 5 years.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**8. Income taxes (Continued)**

The tax loss carryforward does not expire in the Brazilian jurisdiction and the compensation is limited to 30% of the taxable income for the year. For local results taxable in Brazil, there is no restriction to compensated profits from foreign subsidiaries against previously recorded deferred tax assets.

**b) Income tax reconciliation—Income statement**

The total amount presented as income taxes in the income statement is reconciled to the rate established by law, as follows:

	Year ended December 31		
	2017	2016	2015
Income (loss) before income taxes .....	7,829	7,984	(17,679)
Income taxes at statutory rates—34% .....	(2,662)	(2,715)	6,011
<b>Adjustments that affect the basis of taxes:</b>			
Income tax benefit from interest on stockholders' equity .....	728	87	356
Tax incentives .....	372	344	61
Equity results .....	35	107	(151)
Unrecognized tax losses of the year .....	(432)	(708)	(901)
Nondeductible effect of impairment .....	(43)	(97)	(1,865)
Others .....	507	201	1,738
<b>Income taxes .....</b>	<b>(1,495)</b>	<b>(2,781)</b>	<b>5,249</b>

**c) Tax incentives**

In Brazil, Vale has tax incentives to partially reduce the income tax generated by the operations conducted in the North and Northeast regions that includes iron ore, manganese, copper and nickel. The incentive is calculated based on the taxable income of the incentive activity (tax operating income) and takes into account the allocation of tax operating income into different incentives applicable to different tranches of production during the periods specified for each product, generally 10 years. Most of our incentives are expected to expire up to 2024. An amount equal to that obtained with the tax saving must be appropriated in retained earnings reserve account in stockholders' equity, and cannot be distributed as dividends to stockholders.

In addition to those incentives, 30% of the income tax due based on the tax operating income can be reinvested on the purchase of machinery and equipment, subject to subsequent approval by the regulatory agency responsible, Superintendência do Desenvolvimento da Amazonia ("SUDAM") and the Superintendência do Desenvolvimento do Nordeste ("SUDENE"). The reinvestment is accounted in retained earnings reserve account, which restricts the distribution as dividends to stockholders.

Vale is subject to the revision of income tax by local tax authorities in a range up to 10 years depending on jurisdiction where the Company operates.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**8. Income taxes (Continued)**

**d) Income taxes—Settlement program (“REFIS”)**

The balance mainly relates to REFIS to settle most of the claims related to the collection of income tax and social contribution on equity gains of foreign subsidiaries and affiliates from 2003 to 2012. As at December 31, 2017, the balance of US\$5,375 (US\$485 as current and US\$4,890 as non-current) is due in 130 remaining monthly installments, bearing interest at the SELIC rate (Special System for Settlement and Custody), while at December 31, 2016, the balance was US\$5,419 (US\$458 as current and US\$4,961 as non-current).

As at December 31, 2017, the SELIC rate was 7,0% per annum (13.75% per annum at December 31, 2016).

**Accounting policy**

The recognition of income taxes as deferred taxes is based on temporary differences between carrying amount and the tax basis of assets and liabilities as well as taxes losses carryforwards. The deferred income taxes assets and liabilities are offset when there is a legally enforceable right on the same taxable entity.

The deferred taxes assets arising from taxes losses and temporary differences are not recognized when is not probable that future taxable profit will be available against which temporary differences and/or tax losses can be utilized.

Income taxes are recognized in the income statement, except for items recognized directly in stockholders' equity. The provision for income tax is calculated individually for each entity of the Company based on Brazilian tax rates, on an accrual basis, by applying the differential between the nominal local tax rates (based on rules enacted in the location of the entity) and the Brazilian tax rate.

**Critical accounting estimates and judgments**

Deferred tax assets arising from tax losses, negative social contribution basis and temporary differences are registered taking into account the analysis of future performance, considering economic and financial projections, prepared based on internal assumptions and macroeconomic environment, trade and tax scenarios that may be subject to changes in the future. The assumptions of future profits are based on production and sales planning, commodity prices, operational costs, restructuring plans, reclamation and planned capital costs.

**9. Basic and diluted earnings (loss) per share**

As disclosed in note 29, the Company converted its class “A” preferred shares into common shares, without changing the amount of share capital. Therefore, the weighted average number of shares was restated as if the conversion had occurred at the beginning of the last comparative year presented.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**9. Basic and diluted earnings (loss) per share (Continued)**

The basic and diluted earnings (loss) per share are presented below:

	Year ended December 31		
	2017	2016	2015
<b>Net income (loss) attributable to Vale's stockholders:</b>			
Net income (loss) from continuing operations .....	6,313	5,211	(11,929)
Loss from discontinued operations .....	(806)	(1,229)	(200)
<b>Net income (loss) .....</b>	<b>5,507</b>	<b>3,982</b>	<b>(12,129)</b>
<b>Thousands of shares (restated)</b>			
Weighted average number of shares outstanding—common shares .....	5,197,432	5,197,432	5,197,432
<b>Basic and diluted earnings (loss) per share from continuing operations (restated):</b>			
Common share (US\$) .....	1.21	1.00	(2.30)
<b>Basic and diluted loss per share from discontinued operations (restated):</b>			
Common share (US\$) .....	(0.16)	(0.23)	(0.03)
<b>Basic and diluted earnings (loss) per share (restated):</b>			
Common share (US\$) .....	1.05	0.77	(2.33)

The Company does not have potential outstanding shares with dilutive effect on the earnings (loss) per share.

**10. Accounts receivable**

	December 31, 2017	December 31, 2016
Accounts receivable .....	2,660	3,723
Impairment of accounts receivable .....	(60)	(60)
	<b>2,600</b>	<b>3,663</b>
<b>Accounts receivable related to the steel sector—% .....</b>	<b>82.90%</b>	<b>83.44%</b>

	Year ended December 31		
	2017	2016	2015
Impairment of accounts receivable recorded in the income statement .....	(4)	(5)	11

There is no customer that individually represents over 10% of accounts receivable or revenues.

**Accounting policy**

Accounts receivable are financial instruments classified in the category loan and receivables and are the total amount due from sale of products and services rendered by the Company. Accounts receivable are initially recognized at fair value and subsequently measured at amortized cost, less provision for impairment of accounts receivable, when applicable.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**10. Accounts receivable (Continued)**

**Commercial credit risk management**—For the commercial credit exposure, which arises from sales to final customers, the risk management area, in accordance with the current delegation level, approves or request the approval of credit risk limits for each counterparty.

Vale attributes an internal credit risk rating for each counterparty using its 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 the Company's credit risk. The main credit risk mitigation strategies include non-recourse sale of receivables, insurance instruments, letters of credit, corporate and bank guarantees, mortgages, among others.

Vale has a diversified accounts receivable portfolio from a geographical standpoint, with Asia, Europe and Brazil the regions with more significant exposures. According to each region, different guarantees can be used to enhance the credit quality of the receivables.

**11. Inventories**

	<u>December 31, 2017</u>	<u>December 31, 2016</u>
Product inventory .....	2,219	1,573
Work in progress .....	648	800
Consumable inventory .....	1,059	976
<b>Total</b> .....	<b><u>3,926</u></b>	<b><u>3,349</u></b>

In 2017, the Company recognized in the income statement a provision in respect of the net realizable value of product inventory, in the amount of US\$86 (2016: US\$199 and 2015: US\$518).

Product inventories by segments are presented in note 3(b).

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

## 11. Inventories (Continued)

### Accounting policy

Inventories are stated at the lower of cost or the net realizable value. The inventory production cost is determined on the basis of variable and fixed costs, direct and indirect costs of production, using the average cost method. At each statement of financial position date, inventories are assessed for impairment and a provision for losses on obsolete or slow-moving inventory may be recognized. The write-downs and reversals are included in "Cost of goods sold and services rendered".

## 12. Recoverable taxes

Recoverable taxes are presented net of provisions for losses on tax credits.

	December 31, 2017	December 31, 2016
Value-added tax .....	887	724
Brazilian federal contributions.....	880	1,599
Others .....	43	29
<b>Total.....</b>	<b>1,810</b>	<b>2,352</b>
Current .....	1,172	1,625
Non-current .....	638	727
<b>Total.....</b>	<b>1,810</b>	<b>2,352</b>

## 13. Other financial assets and liabilities

	Current		Non-Current	
	December 31, 2017	December 31, 2016	December 31, 2017	December 31, 2016
<b>Other financial assets</b>				
Financial investments.....	18	18	-	-
Loans .....	-	-	151	180
Derivative financial instruments (note 24) .....	106	274	453	446
Related parties (note 30).....	1,898	-	2,628	-
	<b>2,022</b>	<b>292</b>	<b>3,232</b>	<b>626</b>
<b>Other financial liabilities</b>				
Derivative financial instruments (note 24) .....	104	414	686	1,225
Related parties (note 30).....	270	353	975	87
Participative stockholders' debentures .....	-	-	1,233	775
	<b>374</b>	<b>767</b>	<b>2,894</b>	<b>2,087</b>

### Participative stockholders' debentures

At the time of its privatization in 1997, Vale issued debentures to then-existing stockholders, including the Brazilian Government. The debentures' terms were set to ensure that pre-privatization stockholders would participate in potential future benefits that might be obtained from exploiting mineral resources.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**13. Other financial assets and liabilities (Continued)**

A total of 388,559,056 debentures were issued with a par value of R\$0.01 (one cent of Brazilian Real) and are inflation-indexed to the General Market Price Index ("IGP-M"), as set forth in the Issue Deed. The Company paid as remuneration the amount of US\$135 and US\$84, respectively, for the year ended December 31, 2017 and 2016.

**14. Non-current assets and liabilities held for sale and discontinued operations**

	December 31, 2017			December 31, 2016	
	Fertilizers	Fertilizers	Nacala	Shipping assets	Total
<b>Assets</b>					
Accounts receivable .....	90	86	6	–	92
Inventories .....	460	387	2	–	389
Other current assets .....	110	107	114	–	221
Investments in associates and joint ventures .....	83	90	–	–	90
Property, plant and equipment and Intangible .....	2,149	2,694	4,064	357	7,115
Other non-current assets .....	695	679	3	–	682
<b>Total assets .....</b>	<b>3,587</b>	<b>4,043</b>	<b>4,189</b>	<b>357</b>	<b>8,589</b>
<b>Liabilities</b>					
Suppliers and contractors .....	324	280	41	–	321
Other current liabilities .....	215	192	13	–	205
Other non-current liabilities .....	640	559	5	–	564
<b>Total liabilities .....</b>	<b>1,179</b>	<b>1,031</b>	<b>59</b>	<b>–</b>	<b>1,090</b>
<b>Net non-current assets held for sale .....</b>	<b>2,408</b>	<b>3,012</b>	<b>4,130</b>	<b>357</b>	<b>7,499</b>

**a) Fertilizers (Discontinued operations)**

In December 2016, the Company entered into an agreement with The Mosaic Company ("Mosaic") to sell (i) the phosphate assets located in Brazil, except for the assets located in Cubatão, Brazil; (ii) the control of Compañía Minera Miski Mayo S.A.C., in Peru; (iii) the potassium assets located in Brazil; and (iv) the potash projects in Canada. Originally, the agreed amount was US\$2,500, of which US\$1,250 would be paid in cash and the remaining consideration would be settled with 42.3 million common shares to be issued by Mosaic.

In January 2018 (subsequent event), the Company and Mosaic concluded the transaction, which was preceded by final adjustments agreed by the parties under the original terms and conditions of the negotiation. As consequence of these adjustments, the consideration has changed and the Company received US\$1,080 in cash and 34.2 million common shares, corresponding to 8.9% of Mosaic's equity after the issuance of these shares (US\$877, based on the Mosaic's quotation at closing date of the transaction).

Fertilizer's net assets were adjusted to reflect fair value less cost to sell and a loss of US\$729 (US\$1,738 in 2016) was recognized in the income statement from discontinued operations.



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**14. Non-current assets and liabilities held for sale and discontinued operations (Continued)**

**b) Cubatão (part of the fertilizer segment)**

In November 2017, the Company entered into an agreement with Yara International ASA (“Yara”) to sell its nitrogen assets located in Cubatão, Brazil. The agreed consideration is US\$255 to be paid in cash. The Company expects to complete the transaction by the end of 2018, subject to compliance with usual precedent conditions, including approval by the Brazilian anti-trust authority (“CADE”) and other authorities.

These assets were adjusted to reflect fair value less cost to sell and a loss of US\$156 was recognized in the income statement from discontinued operations.

The results for the years and the cash flows of discontinued operations of the Fertilizer segment are presented as follows:

	Year ended December 31		
	2017	2016	2015
<b>Discontinued operations</b>			
Net operating revenue .....	1,746	1,875	2,225
Cost of goods sold and services rendered.....	(1,605)	(1,887)	(1,762)
Operating expenses.....	(141)	(130)	(206)
Impairment of non-current assets .....	(885)	(1,738)	(157)
<b>Operating income (loss) .....</b>	<b>(885)</b>	<b>(1,880)</b>	<b>100</b>
Financial Results, net .....	(28)	20	(147)
Equity results in associates and joint ventures.....	(2)	3	6
<b>Loss before income taxes .....</b>	<b>(915)</b>	<b>(1,857)</b>	<b>(41)</b>
Income taxes .....	102	630	(149)
<b>Loss from discontinued operations.....</b>	<b>(813)</b>	<b>(1,227)</b>	<b>(190)</b>
Net income (loss) attributable to noncontrolling interests.....	(7)	2	10
<b>Loss attributable to Vale’s stockholders .....</b>	<b>(806)</b>	<b>(1,229)</b>	<b>(200)</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**14. Non-current assets and liabilities held for sale and discontinued operations (Continued)**

	Year ended December 31		
	2017	2016	2015
<b>Discontinued operations</b>			
<b>Cash flow from operating activities</b>			
Loss before income taxes.....	(915)	(1,857)	(41)
<b>Adjustments:</b>			
Equity results in associates and joint ventures.....	2	(3)	(6)
Depreciation, amortization and depletion.....	1	347	310
Impairment of non-current assets.....	885	1,738	157
Others.....	-	(20)	148
Increase (decrease) in assets and liabilities.....	114	(25)	(9)
<b>Net cash provided by operating activities.....</b>	<b>87</b>	<b>180</b>	<b>559</b>
<b>Cash flow from investing activities</b>			
Additions to property, plant and equipment.....	(305)	(292)	(257)
Others.....	-	11	(89)
<b>Net cash used in investing activities.....</b>	<b>(305)</b>	<b>(281)</b>	<b>(346)</b>
<b>Cash flow from financing activities</b>			
<b>Loans and borrowings</b>			
Repayments.....	(34)	(17)	(73)
<b>Net cash used in financing activities.....</b>	<b>(34)</b>	<b>(17)</b>	<b>(73)</b>
<b>Net cash provided (used) in discontinued operations.....</b>	<b>(252)</b>	<b>(118)</b>	<b>140</b>

**Accounting policy**

A non-current asset is classified as held for sale if its carrying amount will be recovered principally through a sale transaction rather than through continuing use.

The criteria for recognition the non-current assets as held for sale are only considered satisfied when the sale is highly probable and the asset (or disposal group of assets) is available for immediate sale in its present condition.

The Company measures the assets held for sale (or group of assets) at the lower of its carrying amount and fair value less costs to sell. If the carrying amount exceeds the fair value less costs to sell an impairment loss is recognized against income statement. Any subsequent reversal of impairment is recognized only to the extent of the loss previously recognized.

The assets and liabilities classified as held for sale are presented separately in the statement of financial position.

The classification as a discontinued operation occurs through disposal, or when the operation meets the criteria to be classified as held for sale if this occurs earlier. A discontinued operation is a component of a

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**14. Non-current assets and liabilities held for sale and discontinued operations (Continued)**

Company business comprising cash flows and operations that may be clearly distinct from the rest of the Company and that represents an important separate line of business or geographical area of operations.

The result of discontinued operations is presented in a single amount in the income statement, including the results after income tax of these operations less any impairment loss. Cash flows attributable to operating, investing and financing activities of discontinued operations are disclosed in a separate note.

When an operation is classified as a discontinued operation, the income statements of the prior periods are restated as if the operation had been discontinued since the beginning of the comparative period.

Any noncontrolling interest relating to a group disposal held for sale is presented in the stockholders' equity and are not reclassified in the statement of financial position.

**15. Investments in associates and joint ventures**

The material non-consolidated entities of the Company are as follows:

	Location	Main activity/Business	% Ownership	% Voting capital	% Noncontrolling interest
<b>Joint ventures</b>					
Aliança Geração de Energia S.A. ....	Brazil	Energy	55.0%	55.0%	45.0%
Companhia Coreano-Brasileira de Pelotização .	Brazil	Pellets	50.0%	50.0%	50.0%
Companhia Hispano-Brasileira de Pelotização ..	Brazil	Pellets	50.9%	51.0%	49.1%
Companhia Ítalo-Brasileira de Pelotização .....	Brazil	Pellets	50.9%	51.0%	49.1%
Companhia Nipo-Brasileira de Pelotização .....	Brazil	Pellets	51.0%	51.1%	49.0%
Companhia Siderúrgica do Pecém ("CSP") .....	Brazil	Steel	50.0%	50.0%	50.0%
MRS Logística S.A. ....	Brazil	Logistics	48.2%	46.8%	51.8%
Nacala Corridor Holding Netherlands B.V. ....	Netherlands	Coal	50.0%	50.0%	50.0%
Samarco Mineração S.A. ....	Brazil	Pellets	50.0%	50.0%	50.0%
<b>Direct and indirect associates</b>					
Henan Longyu Energy Resources Co., Ltd. ....	China	Coal	25.0%	25.0%	75.0%
VLI S.A. ....	Brazil	Logistics	37.6%	37.6%	62.4%

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**15. Investments in associates and joint ventures (Continued)**

**a) Changes during the year**

Changes in investments in associates and joint ventures as follows:

	2017			2016		
	Associates	Joint ventures	Total	Associates	Joint ventures	Total
Balance at January 1st, .....	1,437	2,259	3,696	1,323	1,617	2,940
Additions(i) .....	1	92	93	1	238	239
Disposals .....	-	-	-	(7)	-	(7)
Translation adjustment .....	(2)	(28)	(30)	175	338	513
Equity results in income statement .....	57	41	98	69	240	309
Equity results from discontinued operations .....	-	-	-	3	-	3
Equity results in statement of comprehensive income .....	-	(152)	(152)	-	-	-
Dividends declared(ii) .....	(57)	(226)	(283)	(37)	(165)	(202)
Transfer to held for sale .....	-	-	-	(90)	-	(90)
Others .....	5	141	146	-	(9)	(9)
<b>Balance at December 31, .....</b>	<b>1,441</b>	<b>2,127</b>	<b>3,568</b>	<b>1,437</b>	<b>2,259</b>	<b>3,696</b>

(i) Refers to the Coal and Other segments in the amounts of US\$75 and US\$18, respectively, on December 31, 2017 and US\$187 and US\$52, respectively, on December 31, 2016.

(ii) In 2017, the Company received dividends in the amount of US\$227, of which US\$179 were declared during 2017.

The investments by segments are presented in note 3(b).

**b) Acquisitions and divestiture**

**2017**

**Nacala Logistic Corridor**—In December 2014 and as amended in November 2016, the Company signed an agreement with Mitsui & Co., Ltd. (“Mitsui”) to transfer 50% of its stake of 66.7% in Nacala Logistic Corridor, which comprises entities that holds railroads and port concessions located in Mozambique and Malawi. Also, Mitsui committed to acquire 15% participation in the holding entity of Vale Moçambique, which holds the Moatize Coal Project.

In March 2017, the transaction was concluded and Vale received a consideration of US\$690. After the completion of the transaction, the Company (i) holds 81% of Vale Moçambique and retains the control of the Moatize Coal Project and (ii) shares control of the Nacala Logistic Corridor structure (Nacala BV), with Mitsui.

As a consequence of sharing control of Nacala BV, the Company:

(i) derecognized the assets and liabilities classified as held for sale in the total amount of US\$4,144, from which US\$4,063 refers to property, plant and equipment and intangibles;

(ii) derecognized US\$14 related to cash and cash equivalents;

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**15. Investments in associates and joint ventures (Continued)**

(iii) recognized a gain of US\$447 in the income statement related to the sale and the re-measurement at fair value, of its remaining interest at Nacala BV based on the consideration received;

(iv) reclassified the gain related to the cumulative translation adjustments on to income statements in the amount of US\$11;

The result of the transaction regarding the assets from Nacala's logistic corridor was recognized in the income statement as "Impairment and other results on non-current assets".

The results of the transaction with the coal holding entity was recognized in "Results from operation with noncontrolling interest" in the amount of US\$105, directly in Stockholders' Equity.

The consideration received was recognized in the statement of cash flows in "Proceeds from disposal of assets and investments" in the amount of US\$435 and "Transactions with noncontrolling stockholders" in the amount of US\$255.

After the conclusion of the transaction, Vale has outstanding loan balances with Nacala BV and Pangea Emirates Ltd due to the deconsolidation of Nacala Logistic Corridor, the balances as at December 31, 2017 are disclosed in note 30(b). In November 2017, Nacala B. V. signed financing contracts in the form of a project finance in order to receive US\$2.7 billion contracted that will be used to settle a portion of the loan with the Company. The receipt of the proceeds is subject to precedent conditions for a project finance.

**2016**

**Thyssenkrupp Companhia Siderúrgica do Atlântico Ltd ("CSA")**—In April 2016, the Company sold 100% of its interest at CSA (26.87%) for a non-significant amount. The transaction resulted in a loss of US\$75 due to recycling the "Cumulative translation adjustments" recognized in the income statement as "Impairment and others results in associates and joint ventures".

**2015**

**Energy generation assets**—In December 2013, the Company signed agreements with CEMIG Geração e Transmissão S.A. ("CEMIG GT") to incorporate two joint ventures, Aliança Norte Participações S.A. and Aliança Geração de Energia S.A and exchange of assets and shares. The transaction was completed in the first quarter of 2015, in which Vale received cash proceeds of US\$97 and recognized a gain of US\$18 as "Impairment and others results in associates and joint ventures" and a gain of US\$193 as "Impairment and others results of non-current assets".

**Shandong Yankuang International Coking Co., Ltd. ("Yankuang")**—In 2015, the Company completed the sale 100% of its interest at Yankuang, a producer of coking coal, methanol and other products. In this transaction, Vale recognized a gain of US\$79 as "Impairment and others results in associates and joint ventures".

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**15. Investments in associates and joint ventures (Continued)**

Associates and joint ventures	% ownership	% voting capital	Investments in associates and joint ventures		Equity results in the income statement			Dividends received		
			December 31, 2017	December 31, 2016	Year ended December 31			Year ended December 31		
					2017	2016	2015	2017	2016	2015
<b>Ferrous minerals</b>										
Baovale Mineração S.A. ....	50.00	50.00	26	26	7	9	-	1	-	-
Companhia Coreano-Brasileira de Pelotização .....	50.00	50.00	89	68	50	17	25	19	26	19
Companhia Hispano-Brasileira de Pelotização ...	50.89	51.00	82	59	41	15	14	16	27	16
Companhia Ítalo-Brasileira de Pelotização ....	50.90	51.00	80	69	40	16	21	17	9	14
Companhia Nipo-Brasileira de Pelotização ...	51.00	51.11	137	108	93	29	46	29	41	30
MRS Logística S.A. ....	48.16	46.75	517	488	69	57	43	29	10	22
Samarco Mineração S.A. ....	50.00	50.00	-	-	-	-	(167)	-	-	146
VLI S.A. ....	37.60	37.60	968	969	29	36	46	19	-	8
Zhuhai YPM Pellet Co. ....	25.00	25.00	23	21	-	-	-	-	-	-
Others .....			-	-	-	-	(2)	-	-	-
			<b>1,922</b>	<b>1,808</b>	<b>329</b>	<b>179</b>	<b>26</b>	<b>130</b>	<b>113</b>	<b>255</b>
<b>Coal</b>										
Henan Longyu Energy Resources Co., Ltd. ....	25.00	25.00	317	285	20	(4)	(3)	-	-	28
			<b>317</b>	<b>285</b>	<b>20</b>	<b>(4)</b>	<b>(3)</b>	<b>-</b>	<b>-</b>	<b>28</b>
<b>Base metals</b>										
Korea Nickel Corp. ....	25.00	25.00	13	12	1	(1)	(3)	-	4	-
Teal Minerals Inc. ....	50.00	50.00	-	-	-	(3)	(129)	-	-	-
			<b>13</b>	<b>12</b>	<b>1</b>	<b>(4)</b>	<b>(132)</b>	<b>-</b>	<b>4</b>	<b>-</b>
<b>Others</b>										
Aliança Geração de Energia S.A. ....	55.00	55.00	571	582	27	46	50	29	39	30
Aliança Norte Energia Participações S.A. ....	51.00	51.00	160	148	(2)	(6)	1	-	-	-
California Steel Industries, Inc. ....	50.00	50.00	200	185	42	33	(27)	27	4	-
Companhia Siderúrgica do Pecém .....	50.00	50.00	262	527	(264)	25	(307)	-	-	-
Mineração Rio Grande do Norte S.A. ....	40.00	40.00	101	129	13	48	40	41	32	3
Thyssenkrupp Companhia Siderúrgica do Atlântico Ltd. ....	-	-	-	-	-	-	(80)	-	-	-
Others .....			22	20	(68)	(8)	(13)	-	1	2
			<b>1,316</b>	<b>1,591</b>	<b>(252)</b>	<b>138</b>	<b>(336)</b>	<b>97</b>	<b>76</b>	<b>35</b>
<b>Total</b> .....			<b>3,568</b>	<b>3,696</b>	<b>98</b>	<b>309</b>	<b>(445)</b>	<b>227</b>	<b>193</b>	<b>318</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**15. Investments in associates and joint ventures (Continued)**

**c) Summarized financial information**

The summarized financial information about relevant associates and joint-ventures for the Company are as follows:

	December 31, 2017					
	Joint ventures				Associates	
	Aliança Geração de Energia	CSP	Pelletizing(i)	MRS Logística	Henan Longyu	VLI S.A.
Current assets .....	137	759	760	309	1,072	738
Non-current assets .....	1,200	3,712	310	2,063	422	4,170
<b>Total assets</b> .....	<b>1,337</b>	<b>4,471</b>	<b>1,070</b>	<b>2,372</b>	<b>1,494</b>	<b>4,908</b>
Current liabilities .....	86	1,060	301	454	226	537
Non-current liabilities .....	213	2,887	5	844	–	1,799
<b>Total liabilities</b> .....	<b>299</b>	<b>3,947</b>	<b>306</b>	<b>1,298</b>	<b>226</b>	<b>2,336</b>
<b>Stockholders'equity</b> .....	<b>1,038</b>	<b>524</b>	<b>764</b>	<b>1,074</b>	<b>1,268</b>	<b>2,574</b>
<b>Net income (loss)</b> .....	<b>49</b>	<b>(528)</b>	<b>442</b>	<b>143</b>	<b>79</b>	<b>77</b>

	December 31, 2016					
	Joint ventures				Associates	
	Aliança Geração de Energia	CSP	Pelletizing(i)	MRS Logística	Henan Longyu	VLI S.A.
Current assets .....	115	743	392	233	903	389
Non-current assets .....	1,208	3,809	318	2,091	456	4,169
<b>Total assets</b> .....	<b>1,323</b>	<b>4,552</b>	<b>710</b>	<b>2,324</b>	<b>1,359</b>	<b>4,558</b>
Current liabilities .....	165	664	109	433	200	677
Non-current liabilities .....	100	2,835	3	877	19	1,304
<b>Total liabilities</b> .....	<b>265</b>	<b>3,499</b>	<b>112</b>	<b>1,310</b>	<b>219</b>	<b>1,981</b>
<b>Stockholders'equity</b> .....	<b>1,058</b>	<b>1,053</b>	<b>598</b>	<b>1,014</b>	<b>1,140</b>	<b>2,577</b>
<b>Net income (loss)</b> .....	<b>84</b>	<b>49</b>	<b>152</b>	<b>118</b>	<b>(17)</b>	<b>95</b>

(i) Aggregate entity information: Companhia Coreano-Brasileira de Pelotização, Companhia Hispano-Brasileira de Pelotização, Companhia Ítalo-Brasileira de Pelotização, Companhia Nipo-Brasileira de Pelotização.

The stand-alone financial information may differ from the financial information reported herein, since they may be adjusted, when necessary to Vale's accounting policies including eventual goodwill, provisional price adjustment, etc.

**Accounting policy**

**Joint arrangements investments**—Joint arrangements are all entities over which the Company has shared control with one or more parties. Joint arrangement investments are classified as either joint operations or joint ventures depending on the contractual rights and obligations of each investor.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**15. Investments in associates and joint ventures (Continued)**

The joint operations are recorded in the financial statements to represent the Company's contractual rights and obligations. The Company does not have material joint operations.

Interests in joint ventures are accounted for using the equity method, after initially being recognized at cost. The Company's investment in joint ventures includes the goodwill identified in the acquisition, net of any accumulated impairment loss.

The Company's interest in the profits or losses of its joint ventures is recognized in the income statement and participation in the changes in reserves is recognized in the Company's reserves. When the Company's interest in the losses of an associate or joint venture is equal to or greater than the carrying amount of the investment, including any other receivables, the Company does not recognize additional losses, unless it has incurred obligations or made payments on behalf of the joint venture.

**Critical accounting estimates and judgments**

Judgment is required in some circumstances to determine whether after considering all relevant factors, the Company has control, joint control or significant influence over an entity. Significant influence includes situations of collective control.

The Company holds the majority of the voting capital in five joint arrangements (Aliança Geração de Energia S.A., Aliança Norte Energia Participações S.A., Companhia Hispano-Brasileira de Pelotização, Companhia Ítalo-Brasileira de Pelotização and Companhia Nipo-Brasileira de Pelotização), but management have concluded that the Company does not have a sufficiently dominant voting interest to have the power to direct the activities of the entity. As a result, these entities are accounted under equity method due to shareholder's agreements where relevant decisions are shared with other parties.



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**16. Noncontrolling interest**

**a) Summarized financial information**

The summarized financial information, prior to the eliminations of the intercompany balances and transactions, about subsidiaries with material noncontrolling interest are as follows:

	December 31, 2017						
	MBR	PTVI	VNC	Vale Moçambique S.A.	Compañía Mineradora Miski Mayo S.A.C.(i)	Others(ii)	Total
Current assets.....	408	394	251	381	78	-	
Non-current assets.....	3,041	1,586	2,046	1,653	436	-	
Related parties—Stockholders.....	591	147	115	253	6	-	
<b>Total assets</b> .....	<b>4,040</b>	<b>2,127</b>	<b>2,412</b>	<b>2,287</b>	<b>520</b>	<b>-</b>	
Current liabilities.....	170	128	142	128	36	-	
Non-current liabilities.....	288	237	202	32	97	-	
Related parties—Stockholders.....	226	3	1,318	8,232	9	-	
<b>Total liabilities</b> .....	<b>684</b>	<b>368</b>	<b>1,682</b>	<b>8,392</b>	<b>142</b>	<b>-</b>	
Stockholders' equity.....	3,356	1,759	730	(6,105)	380	-	
<b>Equity attributable to noncontrolling interests</b> .....	<b>1,342</b>	<b>735</b>	<b>37</b>	<b>(1,101)</b>	<b>228</b>	<b>73</b>	<b>1,314</b>
Net income (loss).....	434	(15)	(572)	(659)	(11)	-	
<b>Net income (loss) attributable to noncontrolling interests</b> .....	<b>174</b>	<b>(6)</b>	<b>(28)</b>	<b>(104)</b>	<b>(6)</b>	<b>(16)</b>	<b>14</b>
<b>Dividends paid to noncontrolling interests</b> .....	<b>113</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>13</b>	<b>-</b>

(i) Discontinued operations

(ii) Dividends paid to noncontrolling interests relates to Vale Oman Pelletizing



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**16. Noncontrolling interest (Continued)**

	December 31, 2016						
	MBR	PTVI	VNC	Vale Moçambique S.A.	Compañía Mineradora Miski Mayo S.A.C.(i)	Others	Total
Current assets .....	32	444	383	386	94	-	-
Non-current assets .....	3,182	1,668	2,101	1,796	429	-	-
Related parties—Stockholders .....	551	132	79	358	13	-	-
<b>Total assets</b> .....	<b>3,765</b>	<b>2,244</b>	<b>2,563</b>	<b>2,540</b>	<b>536</b>	-	-
Current liabilities .....	106	139	124	95	35	-	-
Non-current liabilities .....	198	261	177	29	99	-	-
Related parties—Stockholders .....	37	6	1,055	7,861	11	-	-
<b>Total liabilities</b> .....	<b>341</b>	<b>406</b>	<b>1,356</b>	<b>7,985</b>	<b>145</b>	-	-
Stockholders' equity .....	3,424	1,838	1,207	(5,445)	391	-	-
<b>Equity attributable to noncontrolling interests</b> .....	<b>1,406</b>	<b>741</b>	<b>40</b>	<b>(272)</b>	<b>235</b>	<b>(168)</b>	<b>1,982</b>
Net income (loss) .....	400	2	(807)	(541)	3	-	-
<b>Net income (loss) attributable to noncontrolling interests</b> .....	<b>165</b>	<b>1</b>	<b>(40)</b>	<b>(27)</b>	<b>2</b>	<b>(107)</b>	<b>(6)</b>
Dividends paid to noncontrolling interests .....	262	-	-	-	28	-	-

	December 31, 2015						
	MBR	PTVI	VNC	Vale Moçambique S.A.	Compañía Mineradora Miski Mayo S.A.C.(i)	Others	Total
Net income (loss) .....	250	36	(1,916)	(3,766)	16	-	-
<b>Net income (loss) attributable to noncontrolling interests</b> .....	<b>66</b>	<b>15</b>	<b>(373)</b>	<b>(188)</b>	<b>10</b>	<b>(21)</b>	<b>(491)</b>
Dividends paid to noncontrolling interests .....	-	-	-	-	40	-	-

(i) Discontinued operation

The stand-alone financial information may differ from the financial information reported herein, since they may be adjusted, when necessary to Vale's accounting policies including eventual goodwill, provisional price adjustment, etc.

**b) Acquisitions and divestments**

In March 2017, the Company concluded the transaction with Mitsui to sell 15% of its stake in Vale Moçambique and 50% of its stake in the Nacala Logistics Corridor. After the completion of the transaction, the Company holds 81% of Vale Moçambique and shares control of the Nacala Logistic Corridor with Mitsui. Further details are disclosed in note 15.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**17. Intangibles**

Changes in intangibles are as follows:

	Goodwill	Concessions	Right of use	Software	Total
<b>Balance at December 31, 2015</b> .....	<b>2,956</b>	<b>1,814</b>	<b>207</b>	<b>347</b>	<b>5,324</b>
Additions .....	–	1,100	1	13	1,114
Disposals .....	–	(12)	–	–	(12)
Amortization .....	–	(248)	(2)	(153)	(403)
Impairment of discontinued operations (note 14) .....	(30)	–	–	–	(30)
Translation adjustment .....	188	570	9	61	828
Transfers .....	–	77	(68)	74	83
<b>Effect of discontinued operations</b>					
Transfer to net assets held for sale .....	(33)	–	–	–	(33)
<b>Balance at December 31, 2016</b> .....	<b>3,081</b>	<b>3,301</b>	<b>147</b>	<b>342</b>	<b>6,871</b>
Cost .....	3,081	4,467	222	1,570	9,340
Accumulated amortization .....	–	(1,166)	(75)	(1,228)	(2,469)
<b>Balance at December 31, 2016</b> .....	<b>3,081</b>	<b>3,301</b>	<b>147</b>	<b>342</b>	<b>6,871</b>
Additions .....	–	980	–	26	1,006
Disposals .....	–	(9)	–	–	(9)
Amortization .....	–	(209)	(2)	(142)	(353)
Translation adjustment .....	65	(79)	7	3	(4)
Merger of Valepar (note 29) .....	964	–	–	–	964
Transfers .....	–	18	–	–	18
<b>Balance at December 31, 2017</b> .....	<b>4,110</b>	<b>4,002</b>	<b>152</b>	<b>229</b>	<b>8,493</b>
Cost .....	4,110	5,075	241	1,554	10,980
Accumulated amortization .....	–	(1,073)	(89)	(1,325)	(2,487)
<b>Balance at December 31, 2017</b> .....	<b>4,110</b>	<b>4,002</b>	<b>152</b>	<b>229</b>	<b>8,493</b>

**a) Goodwill**—The goodwill arose from the acquisition of iron ore and nickel businesses. In 2017, the goodwill was recognized on the acquisition of Vale controlling interest by Valepar, based on the expected future returns on the ferrous segment. As the fundamentals are still valid on the date of the merger of Valepar by Vale, the goodwill was fully recognized. The Company has not recognized the deferred taxes over the goodwill, since there are no differences between the tax basis and accounting basis. The Company assess periodically the recoverable amount of the goodwill.

**b) Concessions**—The concessions refer to the agreements with governments for the exploration and the development of ports and railways. The Company holds railway concessions which are valid over a certain period of time. Those assets are classified as intangible assets and amortized over the shorter of their useful lives and the concession term at the end of which they will be returned to the government.

**c) Right of use**—Refers to intangible identified in the business combination of Vale Canada Limited (“Vale Canada”) and to the usufruct contract between the Company and noncontrolling stockholders to use the shares of Empreendimentos Brasileiros de Mineração S.A. (owner of Minerações Brasileiras Reunidas S.A. shares). The amortization of the right of use will expire in 2037 and Vale Canada’s intangible will end in September of 2046.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**17. Intangibles (Continued)**

**Accounting policy**

Intangibles are carried at the acquisition cost, net of accumulated amortization and impairment charges.

The estimated useful lives are as follows:

	Useful life
Concessions .....	3 to 50 years
Right of use .....	22 to 31 years
Software .....	5 years

**18. Property, plant and equipment**

Changes in property, plant and equipment are as follows:

	Land	Building	Facilities	Equipment	Mineral properties	Others	Constructions in progress	Total
<b>Balance at December 31, 2015</b> .....	<b>766</b>	<b>9,101</b>	<b>8,292</b>	<b>7,307</b>	<b>10,304</b>	<b>7,206</b>	<b>11,126</b>	<b>54,102</b>
Additions(i) .....	-	-	-	-	-	-	5,240	5,240
Disposals .....	(1)	(8)	(9)	(19)	(125)	(384)	(20)	(566)
Assets retirement obligation .....	-	-	-	-	311	-	-	311
Depreciation, amortization and depletion .....	-	(517)	(705)	(906)	(795)	(631)	-	(3,554)
Transfers to non-current assets held for sale .....	-	-	-	-	-	(497)	-	(497)
Impairment (note 19) .....	(1)	(448)	(175)	(110)	(165)	(88)	70	(917)
Impairment of discontinued operations (note 14) .....	(53)	-	(65)	-	(1,590)	-	-	(1,708)
Translation adjustment .....	111	702	960	639	748	861	1,731	5,752
Transfers .....	26	2,177	1,253	978	230	1,110	(5,857)	(83)
<b>Effect of discontinued operations</b>								
Transfer to net assets held for sale .....	(124)	(333)	(80)	(1,095)	(538)	(62)	(429)	(2,661)
<b>Balance at December 31, 2016</b> .....	<b>724</b>	<b>10,674</b>	<b>9,471</b>	<b>6,794</b>	<b>8,380</b>	<b>7,515</b>	<b>11,861</b>	<b>55,419</b>
Cost .....	724	16,678	15,664	11,953	16,066	11,319	11,861	84,265
Accumulated depreciation .....	-	(6,004)	(6,193)	(5,159)	(7,686)	(3,804)	-	(28,846)
<b>Balance at December 31, 2016</b> .....	<b>724</b>	<b>10,674</b>	<b>9,471</b>	<b>6,794</b>	<b>8,380</b>	<b>7,515</b>	<b>11,861</b>	<b>55,419</b>
Additions(i) .....	-	-	-	-	-	-	3,392	3,392
Disposals .....	-	(11)	(57)	(67)	(138)	(212)	(151)	(636)
Assets retirement obligation .....	-	-	-	-	425	-	-	425
Depreciation, amortization and depletion .....	-	(587)	(736)	(814)	(618)	(754)	-	(3,509)
Impairment (note 19) .....	(20)	-	-	(34)	(131)	-	(86)	(271)
Translation adjustment .....	79	(122)	(105)	(83)	222	47	38	76
Transfers .....	(65)	2,146	3,213	1,097	929	1,597	(8,935)	(18)
<b>Balance at December 31, 2017</b> .....	<b>718</b>	<b>12,100</b>	<b>11,786</b>	<b>6,893</b>	<b>9,069</b>	<b>8,193</b>	<b>6,119</b>	<b>54,878</b>
Cost .....	718	19,163	18,292	12,840	17,471	12,461	6,119	87,064
Accumulated depreciation .....	-	(7,063)	(6,506)	(5,947)	(8,402)	(4,268)	-	(32,186)
<b>Balance at December 31, 2017</b> .....	<b>718</b>	<b>12,100</b>	<b>11,786</b>	<b>6,893</b>	<b>9,069</b>	<b>8,193</b>	<b>6,119</b>	<b>54,878</b>

(i) Includes capitalized borrowing costs.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**18. Property, plant and equipment (Continued)**

**a) Disposals of assets**

In June 2016, Vale approved a plan to dispose of its fleet of eleven ships. As consequence, these assets were reclassified to non-current assets held for sale and a loss of US\$66 was recognized in the income statement as "Impairment and other results on non-current assets". In the year ended December 31, 2016, the Company concluded the sale of three Very Large Ore Carriers ("VLOC's") and four Capesize vessels for US\$409.

In the year ended December 31, 2017, the Company concluded the sale of four VLOC's and two Floating Transfer Stations in the amount of US\$391. The Company recognized a loss of US\$133 in the income statement as "Impairment and other results on non-current assets".

Additionally, in 2017, the Company recognized a loss of US\$348 in the income statement as "Impairment and other results on non-current assets" due to non-viable projects and operating assets written off through sale or obsolescence.

**Accounting policy**

Property, plant and equipment is recorded at the cost of acquisition or construction, net of accumulated depreciation and impairment charges.

Mineral properties developed internally are determined by (i) direct and indirect costs attributed to build the mining facilities, (ii) financial charges incurred during the construction period, (iii) depreciation of other fixed assets used during construction, (iv) estimated decommissioning and site restoration expenses, and (v) other capitalized expenditures during the development phase (phase when the project demonstrates its economic benefit to the Company, and the Company has ability and intention to complete the project).

The depletion of mineral properties is determined based on the ratio between production and total proven and probable mineral reserves.

Property, plant and equipment, other than mineral properties are depreciated using the straight-line method based on the estimated useful lives, from the date on which the assets become available for their intended use and are capitalized, except for land which is not depreciated.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**18. Property, plant and equipment (Continued)**

The estimated useful lives are as follows:

	<u>Useful life</u>
Buildings.....	15 to 50 years
Facilities.....	3 to 50 years
Equipment.....	3 to 40 years
<b>Others:</b>	
Locomotives.....	12 to 25 years
Wagon.....	30 to 44 years
Railway equipment.....	5 to 33 years
Ships.....	20 years
Others.....	2 to 50 years

The residual values and useful lives of assets are reviewed at the end of each reporting period and adjusted if necessary.

**a) Mineral reserves**

**Critical accounting estimates and judgments**

The estimates of proven and probable reserves are regularly evaluated and updated. These reserves are determined using generally accepted geological estimates. The calculation of reserves requires the Company to make assumptions about expected future conditions that are uncertain, including future ore prices, exchange rates, inflation rates, mining technology, availability of permits and production costs. Changes in assumptions could have a significant impact on the proven and probable reserves of the Company.

The estimated volume of mineral reserves is used as basis for the calculation of depletion of the mineral properties, and also for the estimated useful life which is a major factor to quantify the provision for asset retirement obligation, environmental recovery of mines and impairment of long lived asset. Any changes to the estimates of the volume of mine reserves and the useful lives of assets may have a significant impact on the depreciation, depletion and amortization charges and assessments of impairment.

**b) Expenditures and stripping costs**

(i) **Exploration and evaluation expenditures**—Expenditures on mining research are accounted for as operating expenses until the effective proof of economic feasibility and commercial viability of a given field can be demonstrated. From then on, the expenditures incurred are capitalized as mineral properties.

(ii) **Expenditures on feasibility studies, new technologies and others research**—The Company also conducts feasibility studies for many businesses which it operates including researching new technologies to optimize the mining process. After these costs are proven to generate future benefits to the Company, the expenditures incurred are capitalized.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**18. Property, plant and equipment (Continued)**

(iii) **Maintenance costs**—Significant industrial maintenance costs, including spare parts, assembly services, and others, are recorded in property, plant and equipment and depreciated through the next programmed maintenance overhaul.

(iv) **Stripping Costs**—The cost associated with the removal of overburden and other waste materials (“stripping costs”) incurred during the development of mines, before production takes place, are capitalized as part of the depreciable cost of the mineral properties. These costs are subsequently amortized over the useful life of the mine.

Post-production stripping costs are included in the cost of inventory, except when a new project is developed to permit access to a significant ore deposits. In such cases, the cost is capitalized as a non-current asset and is amortized during the extraction of the ore deposits, over the useful life of the ore deposits.

Stripping costs are measured at fixed and variable costs directly and indirectly attributable to its removal and, when applicable, net of any impairment losses measured in the same basis adopted for the cash generating unit of which it belongs.

**19. Impairment and onerous contracts**

The impairment losses (reversals) recognized in the year are presented below:

<u>Segments by class of assets</u>	<u>Assets or cash-generating unit</u>	<u>Income statement</u>		
		<u>Impairment (reversals)</u>		
		<u>2017</u>	<u>2016</u>	<u>2015</u>
<b>Property, plant and equipment and intangible</b>				
Iron ore .....	North system	–	(160)	55
Coal .....	Australia	–	27	635
Base metals—nickel .....	Stobie	133	–	–
Base metals—nickel .....	Newfoundland (VNL)	–	631	3,460
Base metals—nickel .....	Nouvelle Calédonie (VNC)	–	284	1,462
Base metals—nickel .....	Onça Puma	–	–	(252)
Coal .....	Mozambique	–	–	2,403
Iron ore .....	Midwest system	–	–	522
Several segments .....	Other assets	138	135	127
<b>Impairment of non-current assets</b> .....		<u>271</u>	<u>917</u>	<u>8,412</u>
Onerous contracts .....		–	257	357
<b>Impairment of non-current assets and onerous contracts</b> .....		<u>271</u>	<u>1,174</u>	<u>8,769</u>
<b>Investments in associates and joint ventures</b>				
Iron ore .....	Samarco Mineração S.A.	–	–	132
Base metals—Copper .....	Teal Minerals Inc.	–	–	314
<b>Impairment of investments in associates and joint ventures</b> .....		<u>–</u>	<u>–</u>	<u>446</u>

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**19. Impairment and onerous contracts (Continued)**

**a) Impairment of non-financial assets**

The Company has carried out an impairment test for the assets that a triggering event was identified. The recoverable amount is assessed by reference to the higher of value in use (“VIU”) and fair value less costs of disposal (“FVLCD”).

The recoverable amount of each Cash Generating Units (“CGU”) under the impairment testing was assessed using FVLCD model, through discounted cash flow techniques, which is classified as “level 3” in the fair value hierarchy.

The cash flows were discounted using a post-tax discount rate ranging from 6% to 9%, which represents an estimate of the rate that a market participant would apply having regard to the time value of money and the risks specific to the asset. The Company used its weighted average cost of capital (“WACC”) as a starting point for determining the discount rates, with appropriate adjustments for the risk profile of the countries in which the individual CGU operate.

**Iron ore and pellets**—During 2017, the Company did not identify any changes in the circumstances or indicators that would require reassessment of the carrying amount of the iron ore and pellets CGUs.

Of the total goodwill (note 17), US\$2,157 is allocated to the group of ferrous mineral CGUs. The impairment analysis based on FVLCD model demonstrates that there were no impairment loss in relation to the individual CGUs or goodwill.

In 2016, based on the market circumstances, the Company decided to resume Norte’s system pelletizing plant, based on the studies carried out by management that demonstrates its economic feasibility. Accordingly, the Company reversed the full impairments of US\$160 recorded in 2013 and 2015.

In 2015, the Company recognized an impairment loss of US\$522 due to lack of competitiveness in the Midwest system because of the complex logistic system associated with the decline in iron ore prices. Accordingly, long-lived assets were fully impaired.

**Coal**—Based on the 2017 impairment triggering assessment, the Company has identified trigger of impairment in the Mozambique CGU, driven by a reduction in the proven and probable reserves due to a geological revision undertaken by Management in the last quarter of 2017. However, coal price projections have increased, triggering a discussion around impairment reversal review. The Company carried out an impairment test based on FVLCD model and concluded that there were no changes in the impairment previously recognized.

In 2016, the future mining plans of the coal assets in Australia were revised and an impairment loss of US\$27 was recognized in the income statement (US\$635 in 2015).



**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**19. Impairment and onerous contracts (Continued)**

In 2015, due to a reduction in the estimated future coal prices, at that point in time, associated with an increase in the logistics costs, the Company recognized an impairment loss of US\$2,403 in relation to the coal asset in Mozambique.

**Nickel**—Based on the 2017 impairment trigger assessment, the Company has identified impairment indicators in the nickel CGUs, driven by a decrease in the nickel long-term price projections. The Company carried out an impairment test based on FVLCD model and concluded that there were no changes in the impairment previously recognized.

Except for an underground mine in Sudbury that was affected by seismic activities and the cost to repair the asset is deemed not recoverable in the current market conditions. Therefore, the Company has placed this asset on “care and maintenance” and an impairment of US\$133 was recognized in the income statement.

Of the total goodwill (note 17), US\$1,953 is allocated to the group of nickel CGUs. The impairment analysis based on FVLCD model demonstrates that there were no impairment loss in relation to the individual CGUs or goodwill.

In 2016, the decrease in long term nickel price projections, that significantly reduced the recoverable amounts of the VNL and VNC CGUs, associated with significant capital investments in new processing facilities in recent years, resulted in impairment losses of US\$631 and US\$284 (2015—US\$3,460 and US\$1,462), respectively.

**b) Onerous contract**

In 2016, the Company recognized a provision of US\$257 (US\$357 in 2015) for the costs in respect of certain long-term contracts in the Midwest system for fluvial transportation and port structure, with minimum guaranteed volume.

**c) Impairment of investments in associates and joint ventures**

In 2015, the Company recognized an impairment of US\$132 in its investment in Samarco (note 21) and US\$314 in Teal Minerals Inc. (“Teal”). Teal recognized an impairment of property, plant and equipment due to the revision of future mining plans and the decrease of the copper price.

**Accounting policy**

**Impairment of non-Financial assets**—Non-financial assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount might not be recoverable. An impairment loss is recognized for the amount by which the asset’s carrying value exceeds its recoverable amount. The recoverable amount is the higher of an asset’s fair value less costs of disposal (“FVLCD”) and value in use (“VIU”).

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**19. Impairment and onerous contracts (Continued)**

FVLCD is generally determined as the present value of the estimated future cash flows expected to arise from the continued use of the asset from a market participant's perspective, including any expansion prospects. VIU model is determined as the present value of the estimated future cash flows expected to arise from the continued use of the asset in its present form. Value in use is determined by applying assumptions specific to the Company's continued use and cannot take into account future development. These assumptions are different to those used in calculating fair value and consequently the VIU calculation is likely to give a different result to a FVLCD calculation.

Assets that have indefinite useful life and are not subject to amortization, such as goodwill, are tested annually for impairment.

For the purposes of assessing impairment, assets are grouped at the lowest levels for which there are separately identifiable cash flows (Cash Generating Units (CGUs)). Goodwill is allocated to Cash Generating Units or Cash Generating Units groups that are expected to benefit from the business combinations in which the goodwill arose and are identified in accordance with the operating segment.

Non-current assets (excluding goodwill) in which the Company recognized impairment in the past are reviewed whenever events or changes in circumstances indicate that the impairment may no longer be applicable. In such cases, an impairment reversal will be recognized.

**Onerous Contracts**—For certain long-term contracts, a provision is recognized when the present value of the unavoidable cost to meet the Company's obligation exceeds the economic benefits that could be received from those contracts.

**Critical accounting estimates and judgments**

The Company determines its cash flows based on the budgets approved by management, which require the use of the following assumptions: (i) mineral reserves and mineral resources measured by internal experts; (ii) costs and investments based on the best estimate of projects as supported by past performance; (iii) sale prices consistent with projections available in reports published by industry considering the market price when appropriate; (iv) the life of each cash-generating unit (ratio between production and mineral reserves); and (v) discount rates that reflect specific risks relating to the relevant assets in each cash-generating unit. These assumptions are subject to risk and uncertainty. Hence, there is a possibility that changes in circumstances will change these projections, which may affect the recoverable amount of the assets.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**20. Loans, borrowings, cash and cash equivalents and financial investments**

**a) Net debt**

The Company evaluates the net debt with the objective of ensuring the continuity of its business in the long term, being able to generate value to its stockholders, through the payment of dividends and capital gain.

	<b>December 31, 2017</b>	<b>December 31, 2016</b>
Debt contracts in the international markets .....	17,288	21,130
Debt contracts in Brazil .....	5,201	8,192
<b>Total of loans and borrowings .....</b>	<b>22,489</b>	<b>29,322</b>
(-) Cash and cash equivalents .....	4,328	4,262
(-) Financial investments .....	18	18
<b>Net debt .....</b>	<b>18,143</b>	<b>25,042</b>

**b) Cash and cash equivalents**

Cash and cash equivalents includes cash, immediately redeemable deposits and short-term investments with an insignificant risk of change in value. They are readily convertible to cash, being US\$1,790 denominated in R\$, indexed to the Brazilian Interbank Interest rate ("DI Rate" or "CDI"), US\$2,395 denominated in US\$, mainly time deposits and US\$143 denominated in other currencies.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**20. Loans, borrowings, cash and cash equivalents and financial investments (Continued)**

**c) Loans and borrowings**

**i) Total debt**

	Current liabilities		Non-current liabilities	
	December 31, 2017	December 31, 2016	December 31, 2017	December 31, 2016
<b>Debt contracts in the international markets</b>				
<b>Floating rates in:</b>				
US\$ .....	310	234	2,764	5,489
EUR .....	-	-	240	211
<b>Fixed rates in:</b>				
US\$ .....	-	-	12,588	13,083
EUR .....	-	-	900	1,583
Other currencies .....	17	17	206	209
Accrued charges .....	263	304	-	-
	<u>590</u>	<u>555</u>	<u>16,698</u>	<u>20,575</u>
<b>Debt contracts in Brazil</b>				
<b>Floating rates in:</b>				
R\$, indexed to TJLP, TR, IPCA, IGP-M and CDI .....	447	402	3,195	5,621
Basket of currencies and US\$ indexed to LIBOR .....	339	343	708	1,217
<b>Fixed rates in:</b>				
R\$ .....	68	66	173	216
Accrued charges .....	259	294	12	33
	<u>1,113</u>	<u>1,105</u>	<u>4,088</u>	<u>7,087</u>
	<u>1,703</u>	<u>1,660</u>	<u>20,786</u>	<u>27,662</u>

The future flows of debt payments principal, per nature of funding and interest are as follows:

	Principal			Total	Estimated future interest payments(i)
	Bank loans	Capital markets	Development agencies		
2018.....	161	-	1,020	1,181	1,245
2019.....	849	-	901	1,750	1,149
2020.....	983	831	761	2,575	1,090
2021.....	574	1,353	696	2,623	945
Between 2022 and 2025.....	503	3,529	950	4,982	2,727
2026 onwards .....	87	8,585	172	8,844	5,929
	<u>3,157</u>	<u>14,298</u>	<u>4,500</u>	<u>21,955</u>	<u>13,085</u>

(i) Estimated future payments of interest, calculated based on interest rate curves and foreign exchange rates applicable as at December 31, 2017 and considering that all amortization payments and payments at maturity on loans and borrowings will be made on their contracted payments dates. The amount includes the estimated values of future interest payments (not yet accrued), in addition to interest already recognized in the financial statements.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**20. Loans, borrowings, cash and cash equivalents and financial investments (Continued)**

At December 31, 2017, the average annual interest rates by currency are as follows:

Loans and borrowings	Average interest rate(i)	Total debt
US\$ .....	5.39%	16,940
R\$(ii) .....	8.14%	4,147
EUR (iii) .....	3.34%	1,177
Other currencies.....	3.23%	225
		<b>22,489</b>

- (i) In order to determine the average interest rate for debt contracts with floating rates, the Company used the rate applicable at December 31, 2017.
- (ii) R\$ denominated debt that bears interest at IPCA, CDI, TR or TJLP, plus spread. For a total of US\$2,329 the Company entered into derivative transactions to mitigate the exposure to the cash flow variations of the floating rate debt denominated in R\$, resulting in an average cost of 1.89% per year in US\$.
- (iii) Eurobonds, for which the Company entered into derivatives to mitigate the exposure to the cash flow variations of the debt denominated in EUR, resulting in an average cost of 4.29% per year in US\$.

**ii) Reconciliation of debt to cash flows arising from financing activities**

	December 31, 2016	Cash flow			Non-cash changes			December 31, 2017
		Additions	Repayments	Interest paid	Transferences	Effect of exchange rate	Interest accretion	
<b>Loans and borrowings</b>								
Current .....	1,660	-	(8,998)	(1,686)	8,971	59	1,697	1,703
Non-current .....	27,662	1,976	-	-	(8,971)	119	-	20,786
<b>Total .....</b>	<b>29,322</b>	<b>1,976</b>	<b>(8,998)</b>	<b>(1,686)</b>	<b>-</b>	<b>178</b>	<b>1,697</b>	<b>22,489</b>

**iii) Credit and financing lines**

Type	Contractual currency	Date of agreement	Period of the agreement	Total amount	Available amount
					December 31, 2017
<b>Credit lines</b>					
Revolving credit facilities.....	US\$	May 2015	5 years	3,000	3,000
Revolving credit facilities.....	US\$	June 2017	5 years	2,000	2,000
<b>Financing lines</b>					
BNDES—CLN 150.....	R\$	September 2012	10 years	1,174	6
BNDES—S11D e S11D Logística .....	R\$	May 2014	10 years	1,863	307

In June 2017, the Company signed a US\$2,000 revolving credit facility, which will be available for five years, to replace the US\$2,000 line that was signed in 2013, which was cancelled. At December 31, 2017, the total available amount in revolving credit facilities remains at US\$5,000.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**20. Loans, borrowings, cash and cash equivalents and financial investments (Continued)**

**Liquidity risk**—The revolving credit facilities available today were acquired from a syndicate of several global commercial banks. To mitigate such risk, Vale has a revolving credit facilities to assist the short term liquidity management and to enable more efficiency in cash management, being consistent with the strategic focus on cost of capital reduction.

**iv) Funding**

In February 2017, the Company issued through Vale Overseas Limited guaranteed notes due August 2026 totaling US\$1,000. The notes bears 6.250% coupon per year, payable semi-annually, and were sold at a price of 107.793% of the principal amount. The notes were consolidated with, and formed a single series with, Vale Overseas's US\$1,000 6.250% notes due 2026 issued on August, 2016. Vale applied the net proceeds from the offering to the early redemption of Vale's €750 notes (due in March 2018).

In September 2017, the Company redeemed all of its 5.625% guaranteed notes due 2019 issued through Vale Overseas Limited totaling US\$1,000. Additionally, the Company conducted a Tender Offer for the outstanding 4.625% guaranteed notes due 2020 issued by its subsidiary Vale Overseas Limited. The total principal amount of 2020 Notes accepted for purchase pursuant to the Tender Offer was US\$501 from a total of US\$1,000.

**v) Guarantees**

As at December 31, 2017 and 2016, loans and borrowings are secured by property, plant and equipment and receivables in the amount of US\$275 and US\$472, respectively.

The securities issued through Vale's 100%-owned finance subsidiary Vale Overseas Limited are fully and unconditionally guaranteed by Vale.

**vi) Covenants**

Some of the Company's debt agreements with lenders contain financial covenants. The primary financial covenants in those agreements require maintaining certain ratios, such as debt to EBITDA and interest coverage. The Company has not identified any instances of noncompliance as at December 31, 2017 and 2016.

**Accounting policy**

Loans and borrowings are initially measured at fair value, net of transaction costs incurred and are subsequently carried at amortized cost and updated using the effective interest rate method. Any difference between the proceeds (net of transaction costs) and the redemption value is recognized in the Income statement over the period of the loan, using the effective interest rate method. The fees paid in obtaining the loan are recognized as transaction costs.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**20. Loans, borrowings, cash and cash equivalents and financial investments (Continued)**

Loans and borrowing costs are capitalized as part of property, plants and equipment if those costs are directly related to a qualified asset. The capitalization occurs until the qualified asset is ready for its intended use. The average capitalization rate is 22%. Borrowing costs that are not capitalized are recognized in the income statement in the period in which they are incurred.

**21. Liabilities related to associates and joint ventures**

In March 2016 Samarco and its shareholders, Vale S.A. and BHP Billiton Brasil Ltda. (“BHPB”), entered into an Agreement (“Framework Agreement”) with the Brazilian federal government, the two Brazilian states (Espírito Santo and Minas Gerais) and other governmental authorities, in connection with the lawsuit related to the Samarco dam failure (Note 27), in order to implement the programs for remediation and compensation of the areas and communities affected.

The Framework Agreement has a 15-year term, renewable for successive one-year periods until all the obligations under the Framework Agreement have been satisfied.

Under the Framework Agreement, Samarco, Vale S.A. and BHPB have established a foundation (“Fundação Renova” or “Foundation”) to develop and implement social and economic remediation and compensation, to be funded by Samarco. To the extent that Samarco does not meet its funding obligations to the foundation, each of Vale S.A. and BHPB will provide, under the terms of the Framework Agreement, funds to the Foundation in proportion to its 50% equity interest in Samarco.

As the consequence of the dam failure, governmental authorities ordered the suspension of Samarco’s operations.

Due to the uncertainties regarding Samarco’s future cash flow, Vale S.A. maintains a provision for the obligation to comply with the reparation and compensation programs under the Framework Agreement (pro rata to its proportional equity interest in Samarco). The movements in the provisions are as follows:

	<u>2017</u>	<u>2016</u>
<b>Balance at January 1st,</b> .....	<b>1,077</b>	<b>–</b>
Additions / Provision recognized .....	38	1,163
Payments .....	(294)	(139)
Interest accretion .....	182	72
Translation adjustment .....	(7)	(19)
<b>Balance at December 31,</b> .....	<b>996</b>	<b>1,077</b>
Current liabilities .....	326	292
Non-current liabilities .....	670	785
<b>Liabilities</b> .....	<b>996</b>	<b>1,077</b>

In addition to the provision above, Vale S.A. made available in the year ended December 31, 2017 the amount of US\$142, which was fully used to fund Samarco’s working capital and was recognized in Vale’s income statement as “Impairment and other results in associates and joint ventures”. Vale S.A. intends to

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**21. Liabilities related to associates and joint ventures (Continued)**

make available until the first half of 2018 up to US\$48 to Samarco to support its working capital requirements, without any binding obligation to Samarco in this regard. Such amounts will be released by the shareholders, simultaneously and pursuant to the same terms and conditions, subject to the fulfillment of certain milestones.

The summarized financial information of Samarco are as follows:

	December 31, 2017	December 31, 2016
Current assets .....	66	164
Non-current assets .....	6,016	5,978
<b>Total assets</b> .....	<b>6,082</b>	<b>6,142</b>
Current liabilities .....	5,481	4,851
Non-current liabilities .....	3,636	3,415
<b>Total liabilities</b> .....	<b>9,117</b>	<b>8,266</b>
<b>Negative reserves</b> .....	<b>(3,035)</b>	<b>(2,124)</b>
<b>Loss</b> .....	<b>(930)</b>	<b>(965)</b>

Under Brazilian legislation and the terms of the joint venture agreement, Vale does not have an obligation to provide funding to Samarco. Therefore, Vale's investment in Samarco was impaired in full and no provision was recognized in relation to the Samarco's negative reserves.

The contingencies related to the Samarco dam failure are disclosed in note 27.

**Critical accounting estimates and judgments**

The provision requires the use of assumptions that may be mainly affected by: (i) changes in scope of work required under the Framework Agreement as result of further technical analysis and the ongoing negotiations with the Federal Prosecution Office, (ii) resolution of uncertainty in respect of the resumption of Samarco's operations; (iii) updates in the discount rate; and (iv) resolution of existing and potential legal claims. As a result, future expenditures may differ from the amounts currently provided and changes to key assumptions could result in a material impact to the amount of the provision in future reporting periods. At each reporting period, Vale S.A. will reassess the key assumptions used by Samarco in the preparation of the projected cash flows and will adjust the provision, if required.

**22. Financial instruments classification**

The Company classifies its financial instruments in accordance with the purpose for which they were acquired, and determines the classification and initial recognition according to the following categories:

	December 31, 2017			December 31, 2016		
	Loans and receivables or amortized cost	At fair value through profit or loss	Total	Loans and receivables or amortized cost	At fair value through profit or loss	Total
<b>Financial assets</b>						
Current						



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**22. Financial instruments classification (Continued)**

	December 31, 2017			December 31, 2016		
	Loans and receivables or amortized cost	At fair value through profit or loss	Total	Loans and receivables or amortized cost	At fair value through profit or loss	Total
<b>Financial assets</b>						
Cash and cash equivalents .....	4,328	-	4,328	4,262	-	4,262
Financial investments .....	18	-	18	18	-	18
Derivative financial instruments .....	-	106	106	-	274	274
Accounts receivable .....	2,600	-	2,600	3,663	-	3,663
Related parties .....	1,898	-	1,898	-	-	-
	<b>8,844</b>	<b>106</b>	<b>8,950</b>	<b>7,943</b>	<b>274</b>	<b>8,217</b>
<b>Non-current</b>						
Derivative financial instruments .....	-	453	453	-	446	446
Loans .....	151	-	151	180	-	180
Related parties .....	2,628	-	2,628	-	-	-
	<b>2,779</b>	<b>453</b>	<b>3,232</b>	<b>180</b>	<b>446</b>	<b>626</b>
<b>Total of financial assets .....</b>	<b>11,623</b>	<b>559</b>	<b>12,182</b>	<b>8,123</b>	<b>720</b>	<b>8,843</b>
<b>Financial liabilities</b>						
<b>Current</b>						
Suppliers and contractors .....	4,041	-	4,041	3,630	-	3,630
Derivative financial instruments .....	-	104	104	-	414	414
Loans and borrowings .....	1,703	-	1,703	1,660	-	1,660
Related parties .....	270	-	270	353	-	353
	<b>6,014</b>	<b>104</b>	<b>6,118</b>	<b>5,643</b>	<b>414</b>	<b>6,057</b>
<b>Non-current</b>						
Derivative financial instruments .....	-	686	686	-	1,225	1,225
Loans and borrowings .....	20,786	-	20,786	27,662	-	27,662
Related parties .....	975	-	975	87	-	87
Participative stockholders' debentures .....	-	1,233	1,233	-	775	775
	<b>21,761</b>	<b>1,919</b>	<b>23,680</b>	<b>27,749</b>	<b>2,000</b>	<b>29,749</b>
<b>Total of financial liabilities .....</b>	<b>27,775</b>	<b>2,023</b>	<b>29,798</b>	<b>33,392</b>	<b>2,414</b>	<b>35,806</b>

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**22. Financial instruments classification (Continued)**

The classification of financial assets and liabilities by currencies are as follows:

	December 31, 2017					
	R\$	US\$	CAD	EUR	Others currencies	Total
<b>Financial assets</b>						
<b>Current</b>						
Cash and cash equivalents .....	1,790	2,395	48	11	84	4,328
Financial investments .....	1	17	-	-	-	18
Derivative financial instruments .....	60	46	-	-	-	106
Accounts receivable .....	246	2,334	6	-	14	2,600
Related parties .....	-	1,898	-	-	-	1,898
	<b>2,097</b>	<b>6,690</b>	<b>54</b>	<b>11</b>	<b>98</b>	<b>8,950</b>
<b>Non-current</b>						
Derivative financial instruments .....	384	69	-	-	-	453
Loans .....	5	146	-	-	-	151
Related parties .....	-	2,628	-	-	-	2,628
	<b>389</b>	<b>2,843</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3,232</b>
<b>Total of financial assets</b> .....	<b>2,486</b>	<b>9,533</b>	<b>54</b>	<b>11</b>	<b>98</b>	<b>12,182</b>
<b>Financial liabilities</b>						
<b>Current</b>						
Suppliers and contractors .....	2,464	1,108	386	49	34	4,041
Derivative financial instruments .....	95	9	-	-	-	104
Loans and borrowings .....	768	880	18	37	-	1,703
Related parties .....	-	270	-	-	-	270
	<b>3,327</b>	<b>2,267</b>	<b>404</b>	<b>86</b>	<b>34</b>	<b>6,118</b>
<b>Non-current</b>						
Derivative financial instruments .....	638	48	-	-	-	686
Loans and borrowings .....	3,379	16,060	207	1,140	-	20,786
Related parties .....	78	897	-	-	-	975
Participative stockholders' debentures .....	1,233	-	-	-	-	1,233
	<b>5,328</b>	<b>17,005</b>	<b>207</b>	<b>1,140</b>	<b>-</b>	<b>23,680</b>
<b>Total of financial liabilities</b> .....	<b>8,655</b>	<b>19,272</b>	<b>611</b>	<b>1,226</b>	<b>34</b>	<b>29,798</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**22. Financial instruments classification (Continued)**

	December 31, 2016					
	R\$	US\$	CAD	EUR	Others currencies	Total
<b>Financial assets</b>						
<b>Current</b>						
Cash and cash equivalents .....	961	2,899	45	56	301	4,262
Financial investments .....	1	17	-	-	-	18
Derivative financial instruments.....	104	170	-	-	-	274
Accounts receivable .....	337	3,310	-	1	15	3,663
	<b>1,403</b>	<b>6,396</b>	<b>45</b>	<b>57</b>	<b>316</b>	<b>8,217</b>
<b>Non-current</b>						
Derivative financial instruments.....	400	46	-	-	-	446
Loans.....	35	96	49	-	-	180
	<b>435</b>	<b>142</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>626</b>
<b>Total of financial assets</b> .....	<b>1,838</b>	<b>6,538</b>	<b>94</b>	<b>57</b>	<b>316</b>	<b>8,843</b>
<b>Financial liabilities</b>						
<b>Current</b>						
Suppliers and contractors.....	1,897	948	612	96	77	3,630
Derivative financial instruments.....	317	97	-	-	-	414
Loans and borrowings .....	752	827	17	64	-	1,660
Related parties .....	-	353	-	-	-	353
	<b>2,966</b>	<b>2,225</b>	<b>629</b>	<b>160</b>	<b>77</b>	<b>6,057</b>
<b>Non-current</b>						
Derivative financial instruments.....	1,052	173	-	-	-	1,225
Loans and borrowings .....	5,869	19,790	209	1,794	-	27,662
Related parties .....	87	-	-	-	-	87
Participative stockholders' debentures.....	775	-	-	-	-	775
	<b>7,783</b>	<b>19,963</b>	<b>209</b>	<b>1,794</b>	<b>-</b>	<b>29,749</b>
<b>Total of financial liabilities</b> .....	<b>10,749</b>	<b>22,188</b>	<b>838</b>	<b>1,954</b>	<b>77</b>	<b>35,806</b>

**23. Fair value estimate**

Due to the short-term cycle, it is assumed that the fair value of cash and cash equivalents balances, financial investments, accounts receivable and accounts payable approximate their book values. For the measurement and determination of fair value, the Company uses various methods including market, income or cost approaches, in order to estimate the value that market participants would use when pricing the asset or liability. The financial assets and liabilities recorded at fair value are classified and disclosed in accordance with the following levels:

**Level 1**—Unadjusted quoted prices on an active, liquid and visible market for identical assets or liabilities that are accessible at the measurement date;

**Level 2**—Quoted prices (adjusted or unadjusted) for identical or similar assets or liabilities on active markets; and

**Level 3**—Assets and liabilities, for which quoted prices, do not exist, or where prices or valuation techniques are supported by little or no market activity, unobservable or illiquid.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**23. Fair value estimate (Continued)**

**a) Assets and liabilities measured and recognized at fair value:**

	December 31, 2017			December 31, 2016		
	Level 2	Level 3	Total	Level 2	Level 3	Total
<b>Financial assets</b>						
Derivative financial instruments .....	289	270	559	405	315	720
<b>Total</b> .....	<u>289</u>	<u>270</u>	<u>559</u>	<u>405</u>	<u>315</u>	<u>720</u>
<b>Financial liabilities</b>						
Derivative financial instruments .....	581	209	790	1,190	449	1,639
Participative stockholders' debentures .....	1,233	-	1,233	775	-	775
<b>Total</b> .....	<u>1,814</u>	<u>209</u>	<u>2,023</u>	<u>1,965</u>	<u>449</u>	<u>2,414</u>

There were no transfers between Level 1 and Level 2, or between Level 2 and Level 3 in the year ended December 31, 2017.

The following table presents the changes in Level 3 assets and liabilities for the year ended December 31, 2017:

	Derivative financial instruments	
	Financial assets	Financial liabilities
Balance at December 31, 2016 .....	315	449
Gain recognized in income statement .....	(45)	(240)
Balance at December 31, 2017 .....	<u>270</u>	<u>209</u>

**Methods and techniques of evaluation**

**i) Derivative financial instruments**

Financial instruments are evaluated by calculating their present value through the use of instrument yield curves at the closing dates. The curves and prices used in the calculation for each group of instruments are detailed in the "market curves".

The pricing method used for European options is the Black & Scholes model. In this model, the fair value of the derivative is a function of the volatility in the price of the underlying asset, the exercise price of the option, the interest rate and period to maturity. In the case of options which income is a function of the average price of the underlying asset over the period of the option, the Company uses Turnbull & Wakeman model. In this model, in addition to the factors that influence the option price in the Black-Scholes model, the formation period of the average price is also considered.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**23. Fair value estimate (Continued)**

In the case of swaps, both the present value of the assets and liability are estimated by discounting the cash flow by the interest rate of the currency in which the swap is denominated. The difference between the present value of assets and liability of the swap generates its fair value.

For the TJLP swaps, the calculation of the fair value assumes that TJLP is constant, that is the projections of future cash flow in Brazilian Reais are made on the basis of the last TJLP disclosed.

Contracts for the purchase or sale of products, inputs and costs of selling with future settlement are priced using the forward yield curves for each product. Typically, these curves are obtained on the stock exchanges where the products are traded, such as the London Metals Exchange ("LME"), the Commodity Exchange ("COMEX") or other providers of market prices. When there is no price for the desired maturity, Vale uses an interpolation between the available maturities.

The fair value for derivatives are within level 3 are measured using discounted cash flows and option model valuation techniques with main unobservable inputs discount rates, stock prices and commodities prices.

**Participative stockholders' debentures**—Consist of the debentures issued during the privatization process (note 13), which fair values are measured based on the market approach. Reference prices are available on the secondary market.

**Critical accounting estimates and judgments**

The fair values of financial instruments that are not traded in active markets are determined using valuation techniques. Vale uses its own judgment to choose between the various methods. Assumptions are based on the market conditions, at the end of the year.

An analysis of the impact if actual results are different from management's estimates is present on note 33 (sensitivity analysis).

**b) Fair value of financial instruments not measured at fair value**

The fair value estimate for level 1 is based on market approach considering the secondary market contracts. For loans allocated to level 2, the income approach is adopted and the fair value for both fixed-indexed rate debt and floating rate debt is determined on a discounted cash flows basis using LIBOR future values and Vale's bonds curve.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**23. Fair value estimate (Continued)**

The fair values and carrying amounts of loans and borrowings (net of interest) are as follows:

<u>Financial liabilities</u>	<u>Balance</u>	<u>Fair value</u>	<u>Level 1</u>	<u>Level 2</u>
<b>December 31, 2017</b>				
Debt principal .....	21,955	23,088	14,935	8,153
<b>December 31, 2016</b>				
Debt principal .....	28,691	27,375	13,874	13,501

**24. Derivative financial instruments**

**a) Derivatives effects on statement of financial position**

	<b>Assets</b>			
	<b>December 31, 2017</b>		<b>December 31, 2016</b>	
	<u>Current</u>	<u>Non-current</u>	<u>Current</u>	<u>Non-current</u>
<b>Derivatives not designated as hedge accounting</b>				
<b>Foreign exchange and interest rate risk</b>				
CDI & TJLP vs. US\$ fixed and floating rate swap .....	38	–	132	1
IPCA swap .....	9	82	7	61
Eurobonds swap .....	–	27	–	–
Pré-dólar swap .....	22	32	1	23
	<b>69</b>	<b>141</b>	<b>140</b>	<b>85</b>
<b>Commodities price risk</b>				
Nickel .....	22	3	4	2
Bunker oil .....	15	–	130	–
	<b>37</b>	<b>3</b>	<b>134</b>	<b>2</b>
<b>Others</b> .....	–	309	–	359
	–	<b>309</b>	–	<b>359</b>
<b>Total</b> .....	<b>106</b>	<b>453</b>	<b>274</b>	<b>446</b>

	<b>Liabilities</b>			
	<b>December 31, 2017</b>		<b>December 31, 2016</b>	
	<u>Current</u>	<u>Non-current</u>	<u>Current</u>	<u>Non-current</u>
<b>Derivatives not designated as hedge accounting</b>				
<b>Foreign exchange and interest rate risk</b>				
CDI & TJLP vs. US\$ fixed and floating rate swap .....	95	410	293	638
IPCA swap .....	–	41	20	57
Eurobonds swap .....	4	–	7	45
Euro Forward .....	–	–	46	–
Pré-dólar swap .....	5	24	5	32
	<b>104</b>	<b>475</b>	<b>371</b>	<b>772</b>
<b>Commodities price risk</b>				
Nickel .....	–	–	5	2
Bunker oil .....	–	–	38	–
	–	–	<b>43</b>	<b>2</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**24. Derivative financial instruments (Continued)**

	Liabilities			
	December 31, 2017		December 31, 2016	
	Current	Non-current	Current	Non-current
Others .....	-	211	-	451
	-	211	-	451
<b>Total .....</b>	<b>104</b>	<b>686</b>	<b>414</b>	<b>1,225</b>

**b) Effects of derivatives on the income statement, cash flow and other comprehensive income**

	Year ended December 31								
	Gain (loss) recognized in the income statement			Financial settlement inflows (outflows)			Gain (loss) recognized in other comprehensive income		
	2017	2016	2015	2017	2016	2015	2017	2016	2015
<b>Derivatives not designated as hedge accounting</b>									
<b>Foreign exchange and interest rate risk</b>									
CDI & TJLP vs. US\$ fixed and floating rate swap ....	152	869	(1,172)	(181)	(513)	(330)	-	-	-
IPCA swap .....	43	78	(61)	(20)	(25)	7	-	-	-
Eurobonds swap .....	36	(19)	(130)	(39)	(142)	(13)	-	-	-
Euro forward .....	46	(46)	-	-	-	-	-	-	-
Pré-dólar swap .....	36	77	(139)	(1)	(90)	(42)	-	-	-
	<b>313</b>	<b>959</b>	<b>(1,502)</b>	<b>(241)</b>	<b>(770)</b>	<b>(378)</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Commodities price risk</b>									
Nickel .....	30	(42)	(49)	4	(30)	(62)	-	-	-
Bunker oil .....	(80)	268	(742)	(3)	(799)	(270)	-	-	-
	<b>(50)</b>	<b>226</b>	<b>(791)</b>	<b>1</b>	<b>(829)</b>	<b>(332)</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Others .....</b>	<b>191</b>	<b>74</b>	<b>(142)</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Derivatives designated as cash flow hedge accounting</b>									
Bunker oil .....	-	-	(439)	-	-	(450)	-	-	435
Foreign exchange .....	-	(3)	(42)	-	(3)	(42)	-	2	17
	<b>-</b>	<b>(3)</b>	<b>(481)</b>	<b>-</b>	<b>(3)</b>	<b>(492)</b>	<b>-</b>	<b>2</b>	<b>452</b>
<b>Total .....</b>	<b>454</b>	<b>1,256</b>	<b>(2,916)</b>	<b>(240)</b>	<b>(1,602)</b>	<b>(1,202)</b>	<b>-</b>	<b>2</b>	<b>452</b>

During 2015, the Company implemented bunker oil purchase cash flows protection program and recognized as cost of goods sold and services rendered and financial expense the amounts of US\$439 and US\$2,477, respectively. In 2016, all derivatives impacts were charged to financial results.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**24. Derivative financial instruments (Continued)**

The maturity dates of the derivative financial instruments are as follows:

	<u>Last maturity dates</u>
Currencies and interest rates.....	January 2024
Bunker oil .....	December 2017
Nickel .....	December 2019
Others .....	December 2027

**c) Hedge in foreign operations**

**Implementation of net investment hedge**

As at January 1, 2017, Vale S.A., which the functional currency is Reais, designated its debts in US\$ and Euro, as an instrument in a hedge of its investment in foreign operations (Vale International S.A. and Vale International Holding GmbH; hedging objects) to mitigate part of the foreign exchange risk on financial statements.

At December 31, 2017 the carrying value of the designated debts are US\$5,303 and EUR750. The foreign exchange loss of US\$144 (US\$95, net of taxes), was recognized in the “Cumulative translation adjustments” in stockholders’ equity for the year ended December 31, 2017. This hedge was highly effective throughout the year ended on December 31, 2017.

**Accounting policy**

The Company uses financial instruments to hedge its exposure to certain market risks arising from operational, financing and investing activities. Derivatives are included within financial assets or liabilities at fair value through profit or loss unless they are designated as effective hedging instruments.

At the beginning of the hedge operations, the Company documents the type of hedge, the relationship between the hedging instrument and hedged items, its risk management objective and strategy for undertaking hedge operations. The Company also documents, both at hedge inception and on an ongoing basis that the hedge is expected to continue to be highly effective. The Company adopts the hedge accounting procedure and designates certain derivatives as either:

**Cash flow hedge**—The effective portion of changes in the fair value of derivatives that are designated and qualify as cash flow hedges is recognized in equity within “Cumulative translation adjustments”. The gain or loss relating to the ineffective portion is recognized immediately in the income statement. When a hedging instrument expires or is sold, or when a hedge no longer meets the criteria for hedge accounting, any cumulative gain or loss existing in equity at that time remains in equity and is recognized in profit or loss when the transaction is recognized in the income statement.

**Net investment hedge**—Hedges of net investments in foreign operations are accounted for similarly to cash flow hedges. Any gain or loss on the hedging instrument relating to the effective portion of the



**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**24. Derivative financial instruments (Continued)**

hedge is recognized in equity within “Cumulative translation adjustments”. The gain or loss relating to the ineffective portion is recognized immediately in the income statement. Gains and losses accumulated in equity are included in the statement of income when the foreign operation is partially or fully disposed of or sold.

**Derivatives at fair value through profit or loss**—Certain derivative instruments do not qualify for hedge accounting. Changes in the fair value of any of these derivative instruments are recognized immediately in the income statement.

The Company has performed an assessment of the IFRS 9—Financial instruments and the expected impacts are detailed in note 2e.

**Additional information about derivatives financial instruments**  
**In millions of United States dollars, except as otherwise stated**

The risk of the derivatives portfolio is measured using the delta-Normal parametric approach, and considers that the future distribution of the risk factors and its correlations tends to present the same statistic properties verified in the historical data. The value at risk estimate considers a 95% confidence level for a one-business day time horizon.

There was no cash amount deposited as margin call regarding derivative positions on December 31, 2017.

The following tables detail the derivatives positions for Vale and its controlled companies as of December 31, 2017, with the following information: notional amount, fair value including credit risk, gains or losses in the period, value at risk and the fair value breakdown by year of maturity.

**a) Foreign exchange and interest rates derivative positions**

**(i) Protection programs for the R\$ denominated debt instruments**

In order to reduce cash flow volatility, swap transactions were implemented to convert into US\$ the cash flows from certain debt instruments denominated in R\$ with interest rates linked mainly to CDI, TJLP and IPCA. In those swaps, Vale pays fixed or floating rates in US\$ and receives payments in R\$ linked to the interest rates of the protected debt instruments.

The swap transactions were negotiated over-the-counter and the protected items are the cash flows from debt instruments linked to R\$. These programs transform into US\$ the obligations linked to R\$ to achieve

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**24. Derivative financial instruments (Continued)**

a currency offset in the Company's cash flows, by matching its receivables—mainly linked to US\$—with its payables.

Flow	Notional		Index	Average rate	Fair value		Financial Settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year		
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			2018	2019	2020+
<b>CDI vs. US\$ fixed rate swap</b>					(33)	(121)	13	15	27	(24)	(37)
Receivable	R\$ 3,540	R\$ 6,289	CDI	101.33%							
Payable	US\$1,104	US\$2,105	Fix	3.20%							
<b>TJLP vs. US\$ fixed rate swap</b>					(380)	(622)	(191)	37	(80)	(245)	(56)
Receivable	R\$ 2,982	R\$ 4,360	TJLP +	1.25%							
Payable	US\$1,323	US\$2,030	Fix	1.55%							
<b>TJLP vs. US\$ floating rate swap</b>					(54)	(55)	(2)	3	(4)	(50)	-
Receivable	R\$ 216	R\$ 242	TJLP +	0.88%							
Payable	US\$ 123	US\$ 140	Libor +	-1.23%							
<b>R\$ fixed rate vs. US\$ fixed rate swap</b>					25	(13)	(1)	27	18	13	(6)
Receivable	R\$ 1,158	R\$ 1,031	Fix	8.02%							
Payable	US\$ 385	US\$ 343	Fix	-0.28%							
<b>IPCA vs. US\$ fixed rate swap</b>					(35)	(51)	(0)	9	7	(15.5)	(27)
Receivable	R\$ 1,000	R\$ 1,000	IPCA +	6.55%							
Payable	US\$ 434	US\$ 434	Fix	3.98%							
<b>IPCA vs. CDI swap</b>					85	42	(20)	0.4	2	(0)	83
Receivable	R\$ 1,350	R\$ 1,350	IPCA +	6.62%							
Payable	R\$ 1,350	R\$ 1,350	CDI	98.58%							

**(ii) Protection program for EUR denominated debt instruments**

In order to reduce the cash flow volatility, swap and forward transactions were implemented to convert into US\$ the cash flows from certain debt instruments issued in Euros by Vale. In those swaps, Vale receives fixed rates in EUR and pays fixed rates in US\$. In those forwards only the principal amount of the debt is converted from EUR to US\$.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**24. Derivative financial instruments (Continued)**

The swap and forward transactions were negotiated over-the-counter and the protected items are the cash flows from debt instruments linked to EUR. The financial settlement inflows/outflows are offset by the protected items' losses/gains due to EUR/US\$ exchange rate.

Flow	Notional				Fair value		Financial Settlement Inflows (Outflows)	Value at Risk	Fair value by year		
	December 31, 2017	December 31, 2016	Index	Average rate	December 31, 2017	December 31, 2016	December 31, 2017	December 31, 2017	2018	2019	2020+
EUR fixed rate vs. US\$ fixed rate swap					23	(52)	(7)	6	(4)	(4)	31
Receivable	€ 500	€ 500	Fix	3.75%							
Payable	US\$ 613	US\$ 613	Fix	4.29%							

Flow	Notional				Fair value		Financial Settlement Inflows (Outflows)	Value at Risk	Fair value by year	
	December 31, 2017	December 31, 2016	Bought / Sold	Average rate (USD/EUR)	December 31, 2017	December 31, 2016	December 31, 2017	December 31, 2017	2018	2019
Forwards	€0	€500	B	1.143	-	(46)	(32)	-	-	-

**b) Commodities derivative positions**

**(i) Bunker Oil purchase cash flows protection program**

In order to reduce the impact of bunker oil price fluctuation on maritime freight hiring/supply and, consequently, reducing the company's cash flow volatility, bunker oil derivatives were implemented, through zero cost-collars.

The derivative transactions were negotiated over-the-counter and the protected item is part of the Vale's costs linked to bunker oil prices. The financial settlement inflows/outflows are offset by the protected items' losses/gains due to bunker oil prices changes.

The contracts expired in 2017.

Flow	Notional (ton)			Average strike (US\$/ton)	Fair value		Financial settlement Inflows (Outflows)	Value at Risk	Fair value by year
	December 31, 2017	December 31, 2016	Bought / Sold		December 31, 2017	December 31, 2016	December 31, 2017	December 31, 2017	2017
<b>Bunker Oil protection</b>									
Call options	-	2,856,000	B	-	-	130	3	-	-
Put options	-	2,856,000	S	-	-	(14)	-	-	-
<b>Total</b>						<b>116</b>	<b>3</b>	<b>-</b>	<b>-</b>

As at December 31, 2016, excludes US\$24, of transactions in which the financial settlement occurs subsequently of the closing month.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**24. Derivative financial instruments (Continued)**

**(ii) Protection programs for base metals raw materials and products**

In the operational protection program for nickel sales at fixed prices, derivatives transactions were implemented to convert into floating prices the contracts with clients that required a fixed price, in order to keep nickel revenues exposed to nickel price fluctuations. Those operations are usually implemented through the purchase of nickel forwards.

In the operational protection program for the purchase of raw materials and products, derivatives transactions were implemented, usually through the sale of nickel and copper forward or futures, in order to reduce the mismatch between the pricing period of purchases (concentrate, cathode, sinter, scrap and others) and the pricing period of the final product sales to the clients.

The derivative transactions are negotiated at London Metal Exchange or over-the-counter and the protected item is part of Vale's revenues and costs linked to nickel and copper prices. The financial settlement inflows/outflows are offset by the protected items' losses/gains due to nickel and copper prices changes.

Flow	Notional (ton)		Bought / Sold	Average strike (US\$/ton)	Fair value		Financial settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year	
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			2017	2018
<b>Fixed price sales protection</b>										
Nickel forwards .....	9,621	11,615	B	10,253	24	(1)	(2)	4	21	3
<b>Raw material purchase protection</b>										
Nickel forwards .....	292	134	S	11,597	(0.3)	0.1	0.3	0.1	(0.3)	-
Copper forwards .....	79	441	S	6,941	(0.0)	(0.1)	(0.3)	0.0	(0.0)	-
<b>Total .....</b>					<b>(0.4)</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.1</b>	<b>(0.4)</b>	<b>-</b>

**c) Wheaton Precious Metals Corp. warrants**

The company owns warrants of Wheaton Precious Metals Corp. (WPM), a Canadian company with stocks negotiated in Toronto Stock Exchange and New York Stock Exchange. Such warrants configure American call options and were received as part of the payment regarding the sale of part of gold payable flows produced as a sub product from Salobo copper mine and some nickel mines in Sudbury.

Flow	Notional (quantity)		Bought / Sold	Average strike (US\$/share)	Fair value		Financial settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year	
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			2017	2023
Call options .....	10,000,000	10,000,000	B	44	39	44	-	4		39

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**24. Derivative financial instruments (Continued)**

**d) Debentures convertible into shares of Valor da Logística Integrada (“VLI”)**

The company has debentures in which lenders have the option to convert the outstanding debt into a specified quantity of shares of VLI owned by the company.

Flow	Notional (quantity)		Bought / Sold	Average strike (R\$/share)	Fair value		Financial settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year 2027
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			
Conversion options .....	140,239	140,239	5	8,530	(57)	(72)	-	3	(57)

**e) Options related to Minerações Brasileiras Reunidas S.A. (“MBR”) shares**

The Company entered into a stock sale and purchase agreement that has options related to MBR shares. Mainly, the Company has the right to buy back this non-controlling interest in the subsidiary. Moreover, under certain restrict and contingent conditions, which are beyond the buyer’s control, such as illegality due to changes in the law, the contract has a clause that gives the buyer the right to sell back its stake to the Company. In this case, the Company could settle through cash or shares.

Flow	Notional (quantity, in millions)		Bought / Sold	Average strike (R\$/share)	Fair value		Financial settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year 2018+
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			
Options .....	2,139	2,139	B/S	1.7	251	121	-	12	251

**f) Embedded derivatives in contracts**

The Company has some nickel concentrate and raw materials purchase agreements in which there are provisions based on nickel and copper future prices behavior. These provisions are considered as embedded derivatives.

Flow	Notional (ton)		Bought / Sold	Average strike (US\$/ton)	Fair value		Financial settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year 2018
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			
Nickel forwards ...	2,627	5,626	S	11,729	1	0		1	1
Copper forwards ..	2,718	3,684	S	6,808	0	2		0	0
<b>Total .....</b>					<b>1</b>	<b>2</b>	<b>-</b>	<b>1</b>	<b>1</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**24. Derivative financial instruments (Continued)**

The Company has also a natural gas purchase agreement in which there's a clause that defines that a premium can be charged if the Company's pellet sales prices trade above a pre-defined level. This clause is considered an embedded derivative.

Flow	Notional (volume/month)		Bought / Sold	Average strike (US\$/ton)	Fair value		Financial settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year	
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			2018	2019+
	Call options	746,667			746,667	S			233	(2)

In August 2014 the Company sold part of its stake in Valor da Logística Integrada ("VLI") to an investment fund managed by Brookfield Asset Management ("Brookfield"). The sales contract includes a clause that establishes, under certain conditions, a minimum return guarantee on Brookfield's investment. This clause is considered an embedded derivative, with payoff equivalent to that of a put option.

Flow	Notional (quantity)		Bought / Sold	Average strike (R\$/share)	Fair value		Financial settlement Inflows (Outflows) December 31, 2017	Value at Risk December 31, 2017	Fair value by year	
	December 31, 2017	December 31, 2016			December 31, 2017	December 31, 2016			2017	2027
	Put option	1,105,070,863			1,105,070,863	S			3.86	(133)

For sensitivity analysis of derivative financial instruments, Financial counterparties' ratings and market curves please see note 33.

**25. Provisions**

	Current liabilities		Non-current liabilities	
	December 31, 2017	December 31, 2016	December 31, 2017	December 31, 2016
Payroll, related charges and other remunerations(i) .....	1,101	725	-	-
Onerous contracts (note 19) .....	102	101	364	473
Environment Restoration .....	30	10	79	111
Asset retirement obligations (note 26) .....	87	47	3,081	2,472
Provisions for litigation (note 27) .....	-	-	1,473	839
Employee postretirement obligations (note 28) .....	74	69	2,030	1,853
<b>Provisions</b> .....	<b>1,394</b>	<b>952</b>	<b>7,027</b>	<b>5,748</b>

(i) Includes profit sharing provision US\$780 and US\$331 for the year ended December 31, 2017 and 2016, respectively.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**26. Asset retirement obligations**

Provision is made for expected costs for the closure of the mines and deactivation of the related mining assets. Changes in the provision for asset retirement obligations and long-term interest rates (per annum, used to discount these obligations to present value and to update the provisions) are as follows:

	December 31, 2017	December 31, 2016
<b>Balance at beginning of the year</b> .....	<u>2,519</u>	<u>2,474</u>
Interest expense .....	70	115
Settlements.....	(60)	(77)
Revisions on cash flows estimates .....	620	230
Translation adjustment .....	96	134
<b>Effect of discontinued operations</b>		
Transfer to net assets held for sale .....	(77)	(357)
<b>Balance at end of the year</b> .....	<u><u>3,168</u></u>	<u><u>2,519</u></u>
Current .....	87	47
Non-current .....	<u>3,081</u>	<u>2,472</u>
	<u><u>3,168</u></u>	<u><u>2,519</u></u>
<b>Long-term interest rates (per annum)</b>		
Brazil .....	5.34%	5.73%
Canada .....	0.57%	0.55%
Other regions .....	0.72%–6.13%	1.07%–8.02%

**Accounting policy**

When the provision is recognized, the corresponding cost is capitalized as part of property, plant and equipment and is depreciated over the useful life of the related mining asset, resulting in an expense recognized in the income statement.

The long-term liability is discounted at presented value using a long-term risk free discount rate applicable to the liability and the unwinds are recorded in the income statement and is reduced by payments for mine closure and decommissioning of mining assets.

The accrued amounts of these obligations are not deducted from the potential costs covered by insurance or indemnities.

**Critical accounting estimates and judgments**

Judgment is required to determine key assumptions used on the asset retirement obligation measurement such as, interest rate, cost of closure, useful life of the mining asset considering the current conditions of closure and the projected date of depletion of each mine. Any changes in these assumptions may significant impact the recorded provision. Therefore, the estimated costs for closure of the mining assets is deemed to be a critical accounting estimate. These estimates are annually reviewed.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**27. Litigation**

**a) Provision for litigation**

Vale is party to labor, civil, tax and other ongoing lawsuits, at administrative and court levels. Provisions for losses resulting from lawsuits are estimated and updated by the Company, based on analysis from the Company's legal consultants.

Changes in provision for litigation are as follows:

	Tax litigation	Civil litigation	Labor litigation	Environmental litigation	Total of litigation provision
<b>Balance at December 31, 2015</b> .....	<b>269</b>	<b>79</b>	<b>454</b>	<b>20</b>	<b>822</b>
Additions .....	23	96	243	2	364
Reversals .....	(37)	(63)	(122)	(5)	(227)
Payments .....	(53)	(59)	(103)	(5)	(220)
Indexation and interest .....	9	16	9	(3)	31
Translation adjustment .....	20	21	89	5	135
<b>Effect of discontinued operations</b>					
Net movements of year .....	-	(1)	8	(1)	6
Transfers to net assets held for sale .....	(17)	(5)	(44)	(6)	(72)
<b>Balance at December 31, 2016</b> .....	<b>214</b>	<b>84</b>	<b>534</b>	<b>7</b>	<b>839</b>
Additions .....	40	53	244	6	343
Reversals .....	(18)	(36)	(118)	(2)	(174)
Payments .....	(117)	(3)	(105)	-	(225)
Indexation and interest .....	10	35	37	(1)	81
Translation adjustment .....	(10)	(2)	(10)	-	(22)
Merger of Valepar (note 29)(i) .....	631	-	-	-	631
<b>Balance at December 31, 2017</b> .....	<b>750</b>	<b>131</b>	<b>582</b>	<b>10</b>	<b>1,473</b>

(i) refers to litigations of PIS/COFINS of interest on capital.

**i. Provisions for labor litigation**—Consist of lawsuits filed by employees and service suppliers, related to employment relationships mainly in Brazil. The most recurring claims are related to payment of overtime, hours in itinerary, and health and safety. Also the social security in Brazil ("INSS") contingencies are related to legal and administrative disputes between INSS and Vale due to applicability of compulsory social security charges.



**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**27. Litigation (Continued)**

**b) Contingent liabilities**

Contingent liabilities of administrative and judicial claims, with expectation of loss classified as possible, and for which the recognition of a provision is not considered necessary by the Company, based on legal advice are as follows:

	December 31, 2017	December 31, 2016
Tax litigation(i) .....	8,840	7,636
Civil litigation .....	1,623	1,515
Labor litigation .....	1,952	2,419
Environmental litigation .....	2,190	1,882
<b>Total</b> .....	<b>14,605</b>	<b>13,452</b>

(i) US\$193 from merger of Valepar S.A.

**i—Tax litigation**—Our most significant tax-related contingent liabilities result from disputes related to (i) the deductibility of our payments of social security contributions on the net income (CSLL) from our taxable income, (ii) challenges of certain tax credits we deducted from our PIS and COFINS payments, (iii) assessments of CFEM (royalties), and (iv) charges of value-added tax on services and circulation of goods (ICMS), especially relating to certain tax credits we claimed from the sale and transmission of energy, ICMS charges to anticipate the payment in the entrance of goods to Pará State and ICMS/penalty charges on our own transportation. The changes reported in the period resulted, mainly, from additions of other periods to the existing proceedings related to PIS, COFINS, ICMS, CFEM; as well as the inclusion of Valepar S.A. proceedings and the application interest and inflation adjustments to the disputed amounts.

**ii—Civil litigation**—Most of those claims have been filed by suppliers for indemnification under construction contracts, primarily relating to certain alleged damages, payments and contractual penalties. A number of other claims related to contractual disputes regarding inflation index.

**iii—Labor litigation**—Represents individual claims by employees and service providers, primarily involving demands for additional compensation for overtime work, time spent commuting or health and safety conditions; and the Brazilian federal social security administration (“INSS”) regarding contributions on compensation programs based on profits.

**iv—Environmental litigation**—The most significant claims concern alleged procedural deficiencies in licensing processes, non-compliance with existing environmental licenses or damage to the environment.

**c) Judicial deposits**

In addition to the provisions and contingent liabilities, the Company is required by law to make judicial deposits to secure a potential adverse outcome of certain lawsuits. These court-ordered deposits are

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**27. Litigation (Continued)**

monetarily adjusted and reported as non-current assets until a judicial decision to draw the deposit occurs.

	December 31, 2017	December 31, 2016
Tax litigation(i) .....	1,201	193
Civil litigation .....	60	62
Labor litigation .....	712	691
Environmental litigation .....	13	16
<b>Total .....</b>	<b>1,986</b>	<b>962</b>

(i) Includes US\$951 related to the merger of Valepar (note 29).

**d) Contingencies related to Samarco accident**

*(i) Public civil claim filed by the Federal Government and others*

The federal government, the two Brazilian states affected by the failure (Espírito Santo and Minas Gerais) and other governmental authorities have initiated a public civil lawsuit against Samarco and its shareholders, Vale S.A. and BHPB, with an estimated value indicated by the plaintiffs of US\$6.1 billion (R\$20.2 billion).

The Framework Agreement signed in March 2016, was ratified by the Federal Regional Court ("TRF") in May 2016. This ratification was suspended by the Superior Court of Justice ("STJ") in June 2016 and resulted in the restoration of the public civil claim, and maintained other measures, such as: (a) the prohibition of the defendants from transferring or conveying any of their interest in its Brazilian iron ore concessions, without, however, limiting their production and commercial activities and; (b) the order of the deposit with the court of US\$363 (R\$1.2 billion) by January 2017, which was provisionally replaced by the guarantees provided for under the agreements with Federal Prosecution Office ("MPF"), as detailed in the item (ii) below.

*(ii) Public civil action filed by Federal Prosecution Office*

On May 3, 2016, the Federal Prosecution Office (MPF) filed a public civil lawsuit against Samarco and its shareholders and presented several demands, including: (i) the adoption of measures for mitigating the social, economic and environmental impacts resulting from the dam failure and other emergency measures; (ii) the payment of compensation to the community; and (iii) payments for the collective moral damage. The action value indicated by the MPF is US\$47 billion (R\$155 billion).

In January 2017 Samarco, Vale S.A. and BHPB entered into two preliminary agreements with the MPF.

The first agreement ("First Agreement") aims to outline the process and timeline for negotiations of a Final Agreement ("Final Agreement"), initially expected to occur by June 30, 2017 and extended by April 20, 2018. This First Agreement establishes a timeline and actions to set the ground for conciliation of

**Notes to the Financial Statements (Continued)**  
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**27. Litigation (Continued)**

two public civil lawsuits in the amounts of US\$6.1 billion (R\$20.2 billion) and US\$47 billion (R\$155 billion), mentioned above, which are actually suspended.

In addition, the First Agreement provides for: (a) the appointment of experts to give support the Federal Prosecutors and paid for by the companies to conduct a diagnosis and monitor the progress of the programs under the Framework Agreement, and (b) holding at public hearings and the engagement of technical assistance to the affected people, in order to allow these communities to take part in the definition of the content of the Final Agreement.

Samarco, Vale S.A. and BHPB has agreed to provide a guarantee for fulfillment of the obligations regarding the financing and payment of the socio-environmental and socio-economic remediation programs resulting from the Fundão dam failure, pursuant to the two public civil actions, until the signing of the Final Agreement, amounting to US\$665 (R\$2.2 billion), of which (i) US\$30 (R\$100 million) in financial investments; (ii) US\$393 (R\$1.3 billion) in insurance bonds; and (iii) US\$242 (R\$800 million) in assets of Samarco. If, by April 20, 2018, the negotiations have not been completed, the Federal Prosecutor's Office may require that the Court re-institute the order for the deposit of US\$363 (R\$1.2 billion) in relation to the US\$6.1 billion (R\$20.2 billion) public civil action and US\$2.2 billion (R\$7.7 billion) related US\$47 billion (R\$155 billion), mentioned above, which are actually suspended.

On March 16, 2017, the 12th Judicial Federal Court of Belo Horizonte partially ratified the First Agreement, which decision includes: (i) ratification of the engagement of experts to perform a socio-environmental impact assessment and assessment of programs under the Framework Agreement and a period for the companies to engage an expert to perform the socio-economic impact assessment; (ii) the consolidation and suspension of related claims aiming to avoid contradictory or conflicting decisions and to establish a unified judicial procedure in order for the parties to be able to reach a final agreement; (iii) accepted the guarantees proposed by Samarco and its shareholders under the Preliminary Agreement on a temporary basis.

In addition, the Second Agreement ("Second Agreement") was signed on January 19, 2017, which establishes a timetable to make funds available to remediate the social, economic and environmental damages caused by the Fundão dam failure in the municipalities of Barra Longa, Rio Doce, Santa Cruz do Escalvado and Ponte Nova, amounting to US\$60 (R\$200 million). The 12th Judicial Federal Court of Belo Horizonte ratified this Second Agreement.

Parties are still negotiating an agreement regarding the choice of the expert to perform the socio-economic impact assessment. In this regard, on November 16th, 2017, they signed an addendum to the First Agreement, in which the parties defined matters related to the socio-economic impact assessment, its institutional structure and the respective experts, which, in the period of 90 days from the signing of the addendum, shall present their technical and commercial proposals.

Alongside, the parties, together with the plaintiffs of the US\$6.1 billion (R\$20.2 billion) public civil lawsuit, the State Prosecutors and the Public Defenders, are conducting the discussions regarding the Final Agreement.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**27. Litigation (Continued)**

*(iii) U.S. Securities class action suits*

Related to the Vale's American Depositary Receipts

Vale S.A. and certain of its officers were named as defendants in securities class action suits in the Federal Court in New York brought by holders of Vale's American Depositary Receipts under U.S. federal securities laws. The lawsuits allege that Vale S.A. made false and misleading statements or did not make disclosures concerning the risks and dangers of the operations of Samarco's Fundão dam and the adequacy of related programs and procedures. The plaintiffs have not specified an amount of alleged damages or indemnities in these actions.

On March 23, 2017 the judge issued a decision rejecting a significant portion of the claims against Vale S.A. and the individual defendants, and determining the prosecution of the action with respect to more limited claims. The portion of plaintiffs' case that remains is related to certain statements about procedures, policies and risk mitigation plans contained in Vale S.A.'s sustainability reports in 2013 and 2014, and certain statements regarding to the responsibility of Vale S.A. for the Fundão dam failure made in a conference call in November 2015.

This lawsuit is currently ongoing with under discovery the gathering of documents to be provided to the plaintiffs.

Vale S.A. continues to contest the outstanding points related to this lawsuit.

Related to the Samarco bonds

In March 2017, holders of bonds issued by Samarco filed a class action suit in the Federal Court in New York against Samarco, Vale S.A. and BHPB under U.S. federal securities laws demanding for indemnification for alleged violation of U.S. federal securities laws. The plaintiffs allege that false and misleading statements were made or disclosures omitted concerning the risks and dangers of the operations of Samarco's Fundão dam and the adequacy of related programs and procedures. It is alleged that with the Fundão dam collapse, the securities have dramatically decreased, in order that the investors who have purchased such securities in a misleading way should be compensated, without, however, specifying an amount for the alleged damages or indemnities in this action.

Vale S.A. continues to contest this lawsuit.

*(iv) Criminal lawsuit*

On October 20, 2016, the MPF brought a criminal lawsuit in the Brazilian Federal Justice Court against Vale S.A., BHPB, Samarco, VogBr Recursos Hídricos e Geotecnia Ltda. and 22 individuals for alleged crimes against the environment, urban planning and cultural heritage, flooding, landslide, as well as for alleged crimes against the victims of the Fundão dam failure.

**Notes to the Financial Statements (Continued)**  
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## **27. Litigation (Continued)**

In November 2017 it was published a decision by means of the Federal Lower Court of Ponte Nova established the resume of the criminal lawsuit and determined the beginning of the Discovery phase.

### *(v) Other lawsuits*

In addition, Samarco and its shareholders were named as a defendant in several other lawsuits brought by individuals, corporations, governmental entities or public prosecutor seeking personal and property damages.

Given the status of these lawsuits, it is not possible at this time to provide a range of possible outcomes or a reliable estimates of potential exposures for Vale S.A. Consequently, no contingent liability has been quantified and no provision was recognized for lawsuits related to Samarco's dam failure.

### **Accounting policy**

A provision is recognized when is considered probable that an outflow of resources will be required to settle the obligation and can be reliably estimated. The liability is accounted against an expense in the income statement. This obligation is updated based on the developments of the judicial process or interest accretion and can be reversed if the expectation of loss is not considered probable due to changes in circumstances or when the obligation is settled.

### **Critical accounting estimates and judgments**

By nature, litigations will be resolved when one or more future event occurs or fails to occur. Typically, the occurrence or not of such events is outside of the Company's control. Legal uncertainties involve the application of significant estimates and judgments by management regarding the potential out comes of future events.

## **28. Employee benefits**

### **a) Employee postretirements obligations**

In Brazil, the management of the pension plans is responsibility of Fundação Vale do Rio Doce de Seguridade Social ("Valia") a nonprofit entity with administrative and financial autonomy. The Brazilian plans are as follows:

**Benefit plan Vale Mais ("Vale Mais") and benefit plan Valiaprev ("Valiaprev")**—Certain Company's employees are participants of Vale Mais and Valiaprev plans with components of defined benefit (specific coverage for death, pensions and disability allowances) and components of defined contributions (for programmable benefits). The defined benefits plan is subject to actuarial evaluations. The defined contribution plan represents a fixed amount held on behalf of the participants. Both Vale Mais and Valiaprev were overfunded as at December 31, 2017 and 2016.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**28. Employee benefits (Continued)**

**Defined benefit plan (“Plano BD”)**—The Plano BD has been closed to new entrants since the year 2000, when the Vale Mais plan was implemented. It is a plan that has defined benefit characteristics, covering almost exclusively retirees and their beneficiaries. It was overfunded as of December 31, 2017 and 2016 and the contributions made by the Company are not relevant.

**Abono complementação benefit plan**—The Company sponsors a specific group of former employees entitled to receive additional benefits from Valia regular payments plus post-retirement benefit that covers medical, dental and pharmaceutical assistance. The contributions made by the Company finished in 2014. The abono complementação benefit was overfunded as at December 31, 2017 and 2016.

**Other benefits**—The Company sponsors medical plans for employees that meet specific criteria and for employees who use the abono complementação benefit. Although those benefits are not specific retirement plans, actuarial calculations are used to calculate future commitments. As those benefits are related to health care plans they have the nature of underfunded benefits, and are presented as underfunded plans as at December 31, 2017 and 2016.

The Foreign plans are managed in accordance with their region. They are divided between plans in Canada, United States of America, United Kingdom, Indonesia, New Caledonia, Japan and Taiwan. Pension plans in Canada are composed of a defined benefit and defined contribution component. Currently the defined benefit plans do not allow new entrants. The foreign defined benefit plans are underfunded as at December 31, 2017 and 2016.

Employers’ disclosure about pensions and other post-retirement benefits on the status of the defined benefit elements of all plans is provided as follows.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**28. Employee benefits (Continued)**

**i. Change in benefit obligation**

	<u>Overfunded pension plans</u>	<u>Underfunded pension plans</u>	<u>Other benefits</u>
<b>Benefit obligation as at December 31, 2015</b> .....	<b>2,474</b>	<b>3,689</b>	<b>1,223</b>
Service costs .....	10	76	(16)
Interest costs .....	362	175	66
Benefits paid .....	(281)	(259)	(61)
Participant contributions .....	1	-	-
Effect of changes in the actuarial assumptions .....	271	117	75
Transfer to held for sale .....	(9)	-	(59)
Translation adjustment .....	515	124	68
Others .....	-	123	-
<b>Benefit obligation as at December 31, 2016</b> .....	<b>3,343</b>	<b>4,045</b>	<b>1,296</b>
Service costs .....	7	86	30
Interest costs .....	360	183	67
Benefits paid .....	(326)	(275)	(65)
Participant contributions .....	-	(12)	-
Effect of changes in the actuarial assumptions .....	64	167	11
Translation adjustment .....	(51)	276	71
<b>Benefit obligation as at December 31, 2017</b> .....	<b>3,397</b>	<b>4,470</b>	<b>1,410</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**28. Employee benefits (Continued)**

**ii. Evolution of assets fair value**

	Overfunded pension plans	Underfunded pension plans	Other benefits
Fair value of plan assets as at December 31, 2015 ..	3,435	3,094	-
Interest income .....	512	151	-
Employer contributions .....	42	99	61
Participant contributions .....	1	-	-
Benefits paid .....	(281)	(259)	(61)
Return on plan assets (excluding interest income) ..	281	71	-
Transfer to held for sale .....	(13)	-	-
Translation adjustment .....	717	105	-
Others .....	-	158	-
Fair value of plan assets as at December 31, 2016 ..	4,694	3,419	-
Interest income .....	513	151	-
Employer contributions .....	45	65	65
Participant contributions .....	-	(12)	-
Benefits paid .....	(326)	(275)	(65)
Return on plan assets (excluding interest income) ..	(21)	174	-
Translation adjustment .....	(77)	254	-
Fair value of plan assets as at December 31, 2017 ..	4,828	3,776	-

**iii. Reconciliation of assets and liabilities recognized in the statement of financial position**

	Plans in Brazil					
	December 31, 2017			December 31, 2016		
	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits
Balance at beginning of the year .....	1,351	-	-	961	-	-
Interest income .....	152	-	-	156	-	-
Changes on asset ceiling and onerous liability .....	(45)	-	-	35	-	-
Translation adjustment .....	(27)	-	-	201	-	-
Transfer to held for sale .....	-	-	-	(2)	-	-
Balance at end of the year .....	1,431	-	-	1,351	-	-
<b>Amount recognized in the statement of financial position</b>						
Present value of actuarial liabilities ...	(3,397)	(401)	(258)	(3,343)	(386)	(227)
Fair value of assets .....	4,828	239	-	4,694	257	-
Effect of the asset ceiling .....	(1,431)	-	-	(1,351)	-	-
<b>Liabilities .....</b>	<b>-</b>	<b>(162)</b>	<b>(258)</b>	<b>-</b>	<b>(129)</b>	<b>(227)</b>
Current liabilities .....	-	-	(22)	-	-	(18)
Non-current liabilities .....	-	(162)	(236)	-	(129)	(209)
<b>Liabilities .....</b>	<b>-</b>	<b>(162)</b>	<b>(258)</b>	<b>-</b>	<b>(129)</b>	<b>(227)</b>



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**28. Employee benefits (Continued)**

	December 31, 2017			December 31, 2016		
	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits
	Foreign plan					
<b>Amount recognized in the statement of financial position</b>						
Present value of actuarial liabilities ...	-	(4,069)	(1,152)	-	(3,659)	(1,069)
Fair value of assets .....	-	3,537	-	-	3,162	-
<b>Liabilities .....</b>	<b>-</b>	<b>(532)</b>	<b>(1,152)</b>	<b>-</b>	<b>(497)</b>	<b>(1,069)</b>
Current liabilities .....	-	(16)	(36)	-	(16)	(35)
Non-current liabilities .....	-	(516)	(1,116)	-	(481)	(1,034)
<b>Liabilities .....</b>	<b>-</b>	<b>(532)</b>	<b>(1,152)</b>	<b>-</b>	<b>(497)</b>	<b>(1,069)</b>
	December 31, 2017			December 31, 2016		
	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits
<b>Balance at beginning of the year .....</b>	<b>1,351</b>	-	-	<b>961</b>	-	-
Interest income .....	152	-	-	156	-	-
Changes on asset ceiling and onerous liability .....	(45)	-	-	35	-	-
Translation adjustment .....	(27)	-	-	201	-	-
Transfer to held for sale.....	-	-	-	(2)	-	-
<b>Balance at end of the year .....</b>	<b>1,431</b>	-	-	<b>1,351</b>	-	-
<b>Amount recognized in the statement of financial position</b>						
Present value of actuarial liabilities ...	(3,397)	(4,470)	(1,410)	(3,343)	(4,045)	(1,296)
Fair value of assets .....	4,828	3,776	-	4,694	3,419	-
Effect of the asset ceiling .....	(1,431)	-	-	(1,351)	-	-
<b>Liabilities .....</b>	<b>-</b>	<b>(694)</b>	<b>(1,410)</b>	<b>-</b>	<b>(626)</b>	<b>(1,296)</b>
Current liabilities .....	-	(16)	(58)	-	(16)	(53)
Non-current liabilities .....	-	(678)	(1,352)	-	(610)	(1,243)
<b>Liabilities .....</b>	<b>-</b>	<b>(694)</b>	<b>(1,410)</b>	<b>-</b>	<b>(626)</b>	<b>(1,296)</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**28. Employee benefits (Continued)**

**iv. Costs recognized in the income statement**

	Year ended December 31								
	2017			2016			2015		
	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits
Service cost .....	7	86	30	10	76	(16)	20	94	28
Interest on expense on liabilities...	360	183	67	362	175	66	359	178	66
Interest income on plan assets .....	(513)	(151)	-	(512)	(151)	-	(491)	(151)	-
Interest expense on effect of (asset ceiling)/ onerous liability ..	152	-	-	156	-	-	132	-	-
<b>Total of cost, net .....</b>	<b>6</b>	<b>118</b>	<b>97</b>	<b>16</b>	<b>100</b>	<b>50</b>	<b>20</b>	<b>121</b>	<b>94</b>

**v. Costs recognized in the statement of comprehensive income**

	Year ended December 31								
	2017			2016			2015		
	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits
Balance at beginning of the year ..	(153)	(496)	(160)	(113)	(495)	(95)	(143)	(570)	(132)
Effect of changes actuarial assumptions .....	(65)	(167)	(27)	(271)	(117)	(75)	184	70	31
Return on plan assets (excluding interest income).....	-	167	-	281	71	-	(284)	(8)	-
Change of asset ceiling / costly liabilities (excluding interest income) .....	47	-	-	(36)	-	-	70	-	-
Others.....	(3)	-	(14)	-	35	-	-	2	1
	<b>(21)</b>	<b>-</b>	<b>(41)</b>	<b>(26)</b>	<b>(11)</b>	<b>(75)</b>	<b>(30)</b>	<b>64</b>	<b>32</b>
Deferred income tax .....	7	(3)	12	9	16	17	10	2	(9)
<b>Others comprehensive income .....</b>	<b>(14)</b>	<b>(3)</b>	<b>(29)</b>	<b>(17)</b>	<b>5</b>	<b>(58)</b>	<b>(20)</b>	<b>66</b>	<b>23</b>
Translation adjustments.....	4	4	1	(23)	(6)	(7)	49	10	14
Transfers/ disposal .....	-	(1)	(1)	-	-	-	1	(1)	-
<b>Accumulated other comprehensive income.....</b>	<b>(163)</b>	<b>(496)</b>	<b>(189)</b>	<b>(153)</b>	<b>(496)</b>	<b>(160)</b>	<b>(113)</b>	<b>(495)</b>	<b>(95)</b>

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**28. Employee benefits (Continued)**

**vi. Risks related to plans**

The Administrators of the plans have committed to strategic planning to strengthen internal controls and risk management. This commitment is achieved by conducting audits including of internal controls, which aim to mitigate operational market and credit risks. Risks are presented as follow:

**Legal**—lawsuits: issuing periodic reports to internal audit and directors contemplating the analysis of lawyers about the possibility of loss (remote, probable or possible), aiming to support the administrative decision regarding provisions. Analysis and ongoing monitoring of developments in the legal scenario and its dissemination within the institution in order to subsidize the administrative plans, considering the impact of regulatory changes.

**Actuarial**—the annual actuarial valuation of the benefit plans comprises the assessment of costs, revenues and adequacy of plan funding. It also considers the monitoring of biometric, economic and financial assumptions (asset volatility, changes in interest rates, inflation, life expectancy, salaries and other).

**Market**—profitability projections are performed for the various plans and profiles of investments for 10 years in the management study of assets and liabilities. These projections include the risks of investments in various market segments. Furthermore, the risks for short-term market of the plans are monitored monthly through metrics of VaR (Value at Risk) and stress testing. For exclusive investment funds of Valia, the market risk is measured daily by the custodian asset bank.

**Credit**—assessment of the credit quality of issuers by hiring expert consultants to evaluate financial institutions and internal assessment of payment ability of non-financial companies. For assets of non-financial companies, the assessment is conducted a monitoring of the company until the maturity of the security.

**vii. Actuarial and economic assumptions and sensitivity analysis**

All calculations involve future actuarial projections about some parameters, such as: salaries, interest, inflation, the trend of social security in Brazil (“INSS”) benefits, mortality and disability.

The economic and actuarial assumptions adopted have been formulated considering the long-term period for maturity and should therefore be examined accordingly. In the short term they may not necessarily be realized.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**28. Employee benefits (Continued)**

In the evaluations were adopted the following assumptions:

	December 31, 2017			December 31, 2016		
	Overfunded pension plans	Underfunded pension plans	Other benefits	Overfunded pension plans	Underfunded pension plans	Other benefits
	Brazil					
Discount rate to determine benefit obligation .....	9.74% - 9.85%	9.84%	9.74% - 9.91%	10.98% - 11.14%	10.98%	10.98% - 11.09%
Nominal average rate to determine expense/income .....	9.74% - 9.85%	9.84%	N/A	10.98% - 11.14%	10.98%	N/A
Nominal average rate of salary increase .....	4.25% - 6.34%	4.25% - 6.34%	N/A	4.85% - 5.95%	6.95%	N/A
Nominal average rate of benefit increase .....	4.85%	4.85%	N/A	6.00%	6.00%	N/A
Immediate health care cost trend rate .....	N/A	N/A	7.38%	N/A	N/A	8.00%
Ultimate health care cost trend rate .....	N/A	N/A	7.38%	N/A	N/A	8.00%
Nominal average rate of price inflation .....	4.25%	4.25%	4.25%	4.85%	4.85%	4.85%
	Foreign					
	December 31, 2017		December 31, 2016			
	Underfunded pension plans	Other benefits	Underfunded pension plans	Other benefits		
Discount rate to determine benefit obligation .....	3.26%	3.44%	3.84%	3.90%		
Nominal average rate to determine expense/ income .....	3.84%	N/A	4.01%	N/A		
Nominal average rate of salary increase .....	3.27%	N/A	4.05%	N/A		
Nominal average rate of benefit increase .....	N/A	3.00%	N/A	3.00%		
Immediate health care cost trend rate .....	N/A	5.99%	N/A	6.30%		
Ultimate health care cost trend rate .....	N/A	4.56%	N/A	4.50%		
Nominal average rate of price inflation .....	2.10%	2.10%	2.00%	2.00%		

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**28. Employee benefits (Continued)**

For the sensitivity analysis, the Company considers the effect of 1% in nominal discount rate to determine the actuarial liability. The effects of this change in actuarial liabilities in premise and adopted the average duration of the plan are as follows:

	December 31, 2017		
	Overfunded pension plans	Underfunded pension plans	Other benefits
<b>Nominal discount rate—1% increase</b>			
Actuarial liability balance .....	3,126	3,943	1,232
Assumptions made .....	10.75%	4.85%	5.61%
<b>Nominal discount rate—1% reduction</b>			
Actuarial liability balance .....	3,715	5,073	1,620
Assumptions made .....	8.75%	2.85%	3.61%

**viii. Assets of pension plans**

Brazilian plan assets as at December 31, 2017 and 2016 includes respectively (i) investments in a portfolio of Vale's stock and other instruments in the amount of US\$37 and US\$26 and (ii) Brazilian Federal Government securities in the amount of US\$4,617 and US\$4,374.

Foreign plan assets as at December 31, 2017 and 2016 includes Canadian Government securities in the amount of US\$864 and US\$735, respectively.

**ix. Overfunded pension plans**

Assets by category are as follows:

	December 31, 2017				December 31, 2016			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Debt securities—Corporate .....	-	72	-	72	-	117	-	117
Debt securities—Government .....	2,757	-	-	2,757	2,612	-	-	2,612
Investments funds—Fixed Income .....	2,515	-	-	2,515	2,411	-	-	2,411
Investments funds—Equity .....	531	-	-	531	168	-	-	168
International investments .....	24	-	-	24	12	-	-	12
Structured investments—Private Equity funds .....	-	-	196	196	217	-	140	357
Structured investments—Real estate funds .....	-	-	15	15	-	-	10	10
Real estate .....	-	-	365	365	-	-	370	370
Loans to participants .....	-	-	224	224	-	-	260	260
<b>Total .....</b>	<b>5,827</b>	<b>72</b>	<b>800</b>	<b>6,699</b>	<b>5,420</b>	<b>117</b>	<b>780</b>	<b>6,317</b>
Funds not related to risk plans .....				(1,871)				(1,623)
<b>Fair value of plan assets at end of year .....</b>				<b>4,828</b>				<b>4,694</b>

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**28. Employee benefits (Continued)**

Measurement of overfunded plan assets at fair value with no observable market variables (level 3) are as follows:

	Private equity funds	Real estate funds	Real estate	Loans to participants	Total
Balance as at December 31, 2015 .....	136	6	319	249	710
Return on plan assets .....	(19)	–	3	33	17
Assets purchases .....	30	3	2	55	90
Assets sold during the year .....	(23)	–	(17)	(121)	(161)
Translation adjustment .....	26	1	63	46	136
Transfer to held for sale .....	(10)	–	–	(2)	(12)
<b>Balance as at December 31, 2016 .....</b>	<b>140</b>	<b>10</b>	<b>370</b>	<b>260</b>	<b>780</b>
Return on plan assets .....	37	(2)	4	29	68
Assets purchases .....	31	8	13	75	127
Assets sold during the year .....	(8)	–	(17)	(137)	(162)
Translation adjustment .....	(4)	(1)	(5)	(3)	(13)
Transfer to held for sale .....	–	–	–	–	–
<b>Balance as at December 31, 2017 .....</b>	<b>196</b>	<b>15</b>	<b>365</b>	<b>224</b>	<b>800</b>

**x. Underfunded pension plans**

Assets by category are as follows:

	December 31, 2017				December 31, 2016			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Cash and cash equivalents .....	4	28	–	32	–	24	–	24
Equity securities .....	1,364	3	–	1,367	1,240	–	–	1,240
Debt securities—Corporate .....	–	338	–	338	–	10	–	10
Debt securities—Government .....	141	801	–	942	83	736	–	819
Investments funds—Fixed Income .....	159	–	–	159	142	307	–	449
Investments funds—Equity .....	8	392	–	400	92	368	–	460
International investments .....	–	–	–	–	–	27	–	27
Structured investments—Private Equity funds .....	97	–	197	294	–	–	187	187
Real estate .....	–	–	44	44	–	–	24	24
Loans to participants .....	–	–	5	5	–	–	6	6
Others .....	–	–	195	195	–	–	173	173
<b>Total .....</b>	<b>1,773</b>	<b>1,562</b>	<b>441</b>	<b>3,776</b>	<b>1,557</b>	<b>1,472</b>	<b>390</b>	<b>3,419</b>

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**28. Employee benefits (Continued)**

Measurement of underfunded plan assets at fair value with no observable market variables (level 3) are as follows:

	Private equity funds	Real estate	Loans to participants	Others	Total
Balance as at December 31, 2015 .....	98	20	5	159	282
Return on plan assets .....	15	-	-	9	24
Assets purchases .....	176	-	-	-	176
Assets sold during the year .....	(110)	-	-	-	(110)
Translation adjustment .....	8	4	1	5	18
<b>Balance as at December 31, 2016 .....</b>	<b>187</b>	<b>24</b>	<b>6</b>	<b>173</b>	<b>390</b>
Return on plan assets .....	8	1	-	10	19
Assets purchases .....	13	17	-	-	30
Assets sold during the year .....	(18)	(1)	-	-	(19)
Translation adjustment .....	7	3	(1)	12	21
<b>Balance as at December 31, 2017 .....</b>	<b>197</b>	<b>44</b>	<b>5</b>	<b>195</b>	<b>441</b>

**xi. Disbursement of future cash flow**

Vale expects to disburse US\$140 in 2018 in relation to pension plans and other benefits.

**xii. Expected benefit payments**

The expected benefit payments, which reflect future services, are as follows:

	December 31, 2017		
	Overfunded pension plans	Underfunded pension plans	Other benefits
2018.....	97	251	67
2019.....	102	252	68
2020.....	108	252	70
2021.....	82	253	72
2022.....	117	256	74
2023 and thereafter .....	641	1,311	397

**b) Profit sharing program ("PLR")**

The Company recorded as cost of goods sold and services rendered and other operating expenses related to the profit sharing program US\$780, US\$331 and US\$42 for the years ended on December 31, 2017, 2016 and 2015, respectively.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**28. Employee benefits (Continued)**

**c) Long-term compensation plan**

For the long-term awarding of eligible executives, the Company compensation plans includes Matching Program and Performance Share Unit Program—PSU, with three to four years-vesting cycles, respectively, with the aim of encouraging employee's retention and stimulating their performance.

For the Matching program, the participants can acquire Vale's common shares in the market without any benefits being provided by Vale. If the shares acquired are held for a period of three years and the participants keep it employment relationship with Vale, the participant is entitled to receive from Vale an award in shares, equivalent to the number of shares originally acquired by the executive. It should be noted that, although a specific custodian of the shares is defined by Vale, the share initially purchased by the executives have no restriction and can be sold at any time. However, if it's done before the end of the three-year-vesting period, they lose the entitlement of receiving the related award paid by Vale.

For PSU program, the eligible executives have the opportunity to receive during a four year-vesting cycle, an award equivalent to the market value of a determined number of common shares and conditioned to Vale's performance factor measured as an indicator of total return to the shareholders (TSR). This award is paid in cash and can occur in cumulative installments of 20% (at the end of 2nd year), 30% (at the end of 3rd year) and 50% (at the end of 4th year), conditioned to the performance factor of each year.

Liabilities of the plans are measured at fair value at every reporting period, based on market rates. Compensation costs incurred are recognized by the defined vesting period of three or four years. For the years ended December 31, 2017, 2016 and 2015 the Company recognized in the income statement the amounts of US\$65, US\$37 and US\$29, respectively, related to long term compensation plan.

**Accounting policy**

**Employee benefits**

**i. Current benefits—wages, vacations and related taxes**

Payments of benefits such as wages or accrued vacation, as well the related social security taxes over those benefits are recognized monthly in income, on an accruals basis.

**ii. Current benefits—profit sharing program**

The Company has the Annual Incentive Program (AIP) based on Team and business unit's contribution and Company-wide performance through operational cash generation. The Company makes an accrual based on evaluation periodic of goals achieved and Company result, using the accrual basis and recognition of present obligation arising from past events in the estimated outflow of resources in the future. The accrual is recorded as cost of goods sold and services rendered or operating expenses in accordance with the activity of each employee.



**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**28. Employee benefits (Continued)**

**iii. Non-current benefits—long-term incentive programs**

The Company has established a procedure for awarding certain eligible executives (Matching and Virtual Shares Programs) with the goal of encouraging employee retention and optimum performance. Plan liabilities are measured at each reporting date, at their fair values, based on market prices. Obligations are measured at each reporting date, at fair values based on market prices. The compensation costs incurred are recognized in income during the vesting period as defined.

**iv. Non-current benefits—pension costs and other post-retirement benefits**

The Company has several retirement plans for its employees.

For defined contribution plans, the Company's obligations are limited to a monthly contribution linked to a pre-defined percentage of the remuneration of employees enrolled in to these plans.

For defined benefit plans, actuarial calculations are periodically obtained for liabilities determined in accordance with the Projected Unit Credit Method in order to estimate the Company's obligation. The liability recognized in the statement of financial position represents the present value of the defined benefit obligation as at that date, less the fair value of plan assets. The Company recognized in the income statement the costs of services, the interest expense of the obligations and the interest income of the plan assets. The remeasurement of gains and losses, return on plan assets (excluding the amount of interest on return of assets, which is recognized in income for the year) and changes in the effect of the ceiling of the active and onerous liabilities are recognized in comprehensive income for the year.

For overfunded plans, the Company does not recognize any assets or benefits in the statement of financial position or income statement until such time as the use of the surplus is clearly defined. For underfunded plans, the Company recognizes actuarial liabilities and results arising from the actuarial valuation.

**Critical accounting estimates and judgments**

**Post-retirement benefits for employees**—The amount recognized and disclosed depend on a number of factors that are determined based on actuarial calculations using various assumptions in order to determine costs and liabilities. One of these assumptions is selection and use of the discount rate. Any changes to these assumptions will affect the amount recognized.

At the end of each year the Company and external actuaries review the assumptions that will be used for the following year. These assumptions are used in determining the fair values of assets and liabilities, costs and expenses and the future values of estimated cash outflows, which are recorded in the plan obligations.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**29. Stockholders' equity**

**a) Conversion of preferred shares and merger of Valepar S.A.**

At the General Extraordinary Stockholders' Meeting, held on June 27, 2017, approved the voluntary conversion of Vale class "A" preferred share into common shares ("ON"), based on the conversion rate of 0.9342 common shares for each Vale class "A" preferred share.

On August 11, 2017, the voluntary conversion period expired and an aggregate of 1,660,581,830 preferred shares (excluding treasury shares), corresponding to 84.4% of the total outstanding preferred shares, were converted into common shares.

At the Extraordinary Stockholders' Meeting of Valepar S.A, held on August 14, 2017, stockholders approved the merger of Valepar with and into Vale. Thereafter, Valepar ceases to exist and, as consequence, its stockholders hold direct interests in Vale, through the 1.2065 Vale common shares received for each Valepar share held by them. As a result, Vale issued 173,543,667 new common shares to Valepar's stockholders, all registered and without par value.

On August 14, 2017, the merger was accounted in Vale's stockholders' equity as capital reserve, based on the accounting appraisal report of Valepar's net assets, amounting US\$1,158.

The impacts arising from the merger in the Company's assets and liabilities are as follows:

	<b>August 14, 2017</b>
Current assets .....	24
Judicial deposits (note 27(c)) .....	951
Intangible (note 17) .....	964
Current liabilities .....	20
Provisions for litigation (note 27(a)) .....	631
Taxes payable (note 8) .....	130
<b>Net assets</b> .....	<b>1,158</b>

At the Extraordinary Stockholders' Meeting and at the Special Stockholders' Meeting, held on October 18, 2017, preferred stockholders approved the conversion of all Class "A" preferred shares into common shares of the Company, in the proportion of 0.9342 common share for each class "A" preferred share. During the period from October 20, 2017 until November 21, 2017, inclusive, the stockholders holding Vale's Class "A" preferred shares dissenting with regard to the resolution of the Special Meeting, had the right to withdraw from the Company, receiving R\$24.26 per share which is the equivalent of Vale stockholders' equity per share at December 31, 2016. At the end of this period, 10,397 common shares were converted into treasury shares (corresponding to 11,130 preferred shares).

At the Extraordinary Stockholders' Meeting held on December 21, 2017 approved the migration of the Company to the special listing segment of B3 S.A. ("Novo Mercado"), following the conversion of the class "A" preferred shares into common shares.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**29. Stockholders' equity (Continued)**

The stockholders' equity corresponds to 5,284,474,770 common shares and 12 preferred shares special class ("PNE" or "Golden shares"), and there were no changes in the amount of share capital.

	Share position before conversion	Conversion of the preferred shares	Issue of new shares	Share position after conversion
<b>Shares outstanding</b>				
ON .....	3,185,653,000	1,838,235,414	173,543,667	5,197,432,081
PNA/PNE .....	1,967,721,926	(1,967,721,914)	-	12
	<u>5,153,374,926</u>	<u>(129,486,500)</u>	<u>173,543,667</u>	<u>5,197,432,093</u>
<b>Shares in treasury</b>				
ON .....	31,535,402	55,507,287	-	87,042,689
PNA .....	59,405,792	(59,405,792)	-	-
<b>Total issued shares</b> .....	<u>5,244,316,120</u>	<u>(133,385,005)</u>	<u>173,543,667</u>	<u>5,284,474,782</u>

The basic and diluted earnings per share were recalculated considering the changes in the number of shares, as described above. The comparative information for the years ended December 31, 2016 and 2015 were restated, as presented in note 9.

**b) Share capital**

As at December 31, 2017, the share capital was US\$61,614 corresponding to 5,284,474,782 shares issued and fully paid without par value.

	December 31, 2017			December 31, 2016		
	ON	PNE	Total	ON	PNA	Total
Stockholders .....						
Litel Participações S.A. and Litela						
Participações S.A. ....	1,108,483,410	-	1,108,483,410	-	-	-
BNDES Participações S.A. ....	401,457,757	-	401,457,757	206,378,882	66,185,272	272,564,154
Bradespar S.A. ....	332,965,266	-	332,965,266	-	-	-
Mitsui & Co., Ltd .....	286,347,055	-	286,347,055	-	-	-
Valepar S.A. ....	-	-	-	1,716,435,045	20,340,000	1,736,775,045
Brazilian Government (Golden Share) .	-	12	12	-	12	12
Foreign investors—ADRs .....	1,292,115,112	-	1,292,115,112	786,067,634	610,880,671	1,396,948,305
Foreign institutional investors in local market .....	1,129,164,954	-	1,129,164,954	262,868,264	825,753,408	1,088,621,672
FMP—FGTS .....	62,061,672	-	62,061,672	70,662,746	-	70,662,746
PIBB—Fund .....	2,632,618	-	2,632,618	741,730	1,171,101	1,912,831
Institutional investors .....	277,003,730	-	277,003,730	104,510,549	133,496,260	238,006,809
Retail investors in Brazil .....	305,200,507	-	305,200,507	37,988,150	309,895,202	347,883,352
<b>Shares outstanding</b> .....	<u>5,197,432,081</u>	<u>12</u>	<u>5,197,432,093</u>	<u>3,185,653,000</u>	<u>1,967,721,926</u>	<u>5,153,374,926</u>
<b>Shares in treasury</b> .....	<u>87,042,689</u>	<u>-</u>	<u>87,042,689</u>	<u>31,535,402</u>	<u>59,405,792</u>	<u>90,941,194</u>
<b>Total issued shares</b> .....	<u>5,284,474,770</u>	<u>12</u>	<u>5,284,474,782</u>	<u>3,217,188,402</u>	<u>2,027,127,718</u>	<u>5,244,316,120</u>
<b>Share capital per class of shares (in   millions)</b> .....	<u>61,614</u>	<u>-</u>	<u>61,614</u>	<u>38,525</u>	<u>23,089</u>	<u>61,614</u>
<b>Total authorized shares</b> .....	<u>7,000,000,000</u>	<u>-</u>	<u>7,000,000,000</u>	<u>3,600,000,000</u>	<u>7,200,000,000</u>	<u>10,800,000,000</u>

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**29. Stockholders' equity (Continued)**

The Board of Directors may, regardless of changes to by-laws, issue new common shares (up to the total authorized shares), including the capitalization of profits and reserves to the extent authorized.

The Company repurchases its shares to hold in treasury for future sale or cancellation. These shares are recorded in a specific account as a reduction of stockholders' equity at their acquisition value and carried at cost. These programs are approved by the Board of Directors with a determined terms and numbers of shares. Currently, the Company does not have any share repurchase program.

Incremental costs directly attributable to the issue of new shares or options are recognized in stockholders' equity as a deduction from the amount raised, net of taxes.

**c) Remuneration to the Company's stockholders**

The Company's by-laws determine the minimum remuneration to stockholders of 25% of net income, after appropriations to legal reserve and tax incentive reserve, as follows:

	<b>2017</b>
<b>Net income of the year</b> .....	<b>5,507</b>
Appropriation to legal reserve .....	(275)
Appropriation to tax incentive reserve .....	(216)
<b>Net income after appropriations to legal reserve and tax incentive reserve</b> .....	<b>5,016</b>
Minimum mandatory remuneration(i) .....	1,475
Appropriation to investments reserve .....	3,541

(i) The minimum mandatory remuneration were based on interest on capital and will be paid in 2018, in the amount of US\$0.28378015600 per share. Due to the Brazilian legislation, the Company must retain and collect the amount of withholding tax (15%) and cannot be considered when charging the interest on capital to the mandatory dividend.

On December 14, 2017, the Board of Directors approved the payment in advance of the stockholders' remuneration in the gross amount of US\$682 (R\$2,183 million) based on the interest on capital, as an anticipation relating to 2017. The Board of Directors approved on February 26, 2018 (subsequent event), the complementary payment to the stockholders' remuneration in the gross amount of US\$793 (R\$2,538 million) based on the interest on capital. Together, these resolutions comprise the minimum mandatory remuneration for the year ended December 31, 2017 that will be paid in March 2018.

The remuneration paid to stockholders based on the on interest on capital during 2017 and 2016 amounted US\$1,456 (US\$0.282400343 per share) and US\$250 (US\$0.048511898 per share), respectively. All remuneration was based on interest on capital for those years.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**29. Stockholders' equity (Continued)**

**d) Profit reserves**

The amount of profit reserves are distributed as follows:

	Legal reserve	Tax incentive reserve	Investments reserve	Additional remuneration reserve	Total of profit reserves
Balance as at December 31, 2015 .....	985	-	-	-	985
Allocation of Income .....	204	377	1,808	634	3,023
Translation adjustment .....	195	-	-	-	195
<b>Balance as at December 31, 2016 .....</b>	<b>1,384</b>	<b>377</b>	<b>1,808</b>	<b>634</b>	<b>4,203</b>
Allocation of Income .....	275	216	3,541	-	4,032
Dividends and interest on capital of Vale's stockholders .....	-	-	-	(658)	(658)
Translation adjustment .....	(29)	(13)	(140)	24	(158)
<b>Balance as at December 31, 2017 .....</b>	<b>1,630</b>	<b>580</b>	<b>5,209</b>	<b>-</b>	<b>7,419</b>

**Legal reserve**—Is a legal requirement for Brazilian public companies to retain 5% of the annual net income up to 20% of the capital. The reserve can only be used to compensate losses or to increase capital.

**Tax incentive reserve**—Results from the option to designate a portion of the income tax for investments in projects approved by the Brazilian Government as well as tax incentives.

**Investment reserve**—Aims to ensure the maintenance and development of the main activities that comprise the Company's operations and to retain budgeted capital for investments. Based on the Company's by-laws, this reserve is capped to 50% of the annual distributable net income, up to the amount of the share capital. The remaining balance over than 50% of the annual distributable net income is retained based on the capital investments budget submitted for approval in the Stockholder's Meeting, pursuant to article 196 of the Law 6,404.

**Additional remuneration reserve**—Arises from the remuneration proposed by Management that exceeds the minimum mandatory remuneration of 25% of the adjusted net income. On April 20, 2017, Stockholders approved the payment of the additional remuneration in relation to the year ended December 31, 2016.



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**29. Stockholders' equity (Continued)**

**e) Unrealized fair value gain (losses)**

	Retirement benefit obligations	Cash flow hedge	Available-for-sale financial instruments	Conversion shares	Total gain (losses)
Balance as at December 31, 2015 .....	(703)	(6)	(1)	(282)	(992)
Other comprehensive income .....	(70)	7	1	–	(62)
Translation adjustment .....	(36)	(1)	–	(56)	(93)
<b>Balance as at December 31, 2016 .....</b>	<b>(809)</b>	<b>–</b>	<b>–</b>	<b>(338)</b>	<b>(1,147)</b>
Other comprehensive income .....	(46)	–	–	–	(46)
Translation adjustment .....	10	–	–	–	10
<b>Balance as at December 31, 2017 .....</b>	<b>(845)</b>	<b>–</b>	<b>–</b>	<b>(338)</b>	<b>(1,183)</b>

**f) Shareholders Agreement**

On the date of the merger of Valepar into Vale, August 14, 2017, the former Controlling Shareholders of Valepar executed a new shareholders' agreement ("Vale Agreement") that binds only 20% of the totality of Vale's common shares issued by Vale, and will be in force until November 9, 2020, with no provision for renewal.

For 6 months from the date of entry into force of the Vale Agreement, the Shareholders will be obligated not to transfer, by any means, either directly or indirectly, Vale shares they receive as a result of the implementation of the Proposal ("Lock-Up"), except for (i) the transfer of Vale's shares by the Shareholders to their affiliates and their current shareholders, provided that such transferred shares shall remain subject to the Lock-Up, and (ii) the transfer of shares held by the Shareholders prior to the merger of Valepar.

**Accounting policy**

**Stockholder's remuneration**—The stockholder's remuneration is paid on dividends and interest on capital. This remuneration is recognized as a liability in the financial statements of the Company based on bylaws. Any amount above the minimum mandatory remuneration approved by the by-laws shall only be recognized in current liabilities on the date that is approved by stockholders.

The Company is permitted to distribute interest attributable to stockholders' equity. The calculation is based on the stockholders' equity amounts as stated in the statutory accounting records and the interest rate applied may not exceed the Brazilian Government Long-term Interest Rate ("TJLP") determined by the Central Bank of Brazil. Also, such interest may not exceed 50% of the net income for the year or 50% of retained earnings plus profit reserves as determined by Brazilian corporate law.

The benefit to the Company, as opposed to making a dividend payment, is a reduction in the income tax burden because this interest charge is tax deductible in Brazil. Income tax of 15% is withheld on behalf of

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**29. Stockholders' equity (Continued)**

the stockholders relative to the interest distribution. Under Brazilian law, interest attributed to stockholders' equity is considered as part of the annual minimum mandatory dividend. This notional interest distribution is treated for accounting purposes as a deduction from stockholders' equity in a manner similar to a dividend and the tax deductibility recorded in the income statement.

**30. Related parties**

The Company's related parties are predominantly subsidiaries, joint ventures, associates and key management personnel of the Company. Transactions between the parent company and its subsidiaries are eliminated on consolidation and are not disclosed in this note. Details of material non-consolidated entities are disclosed in note 15.

Related party transactions were made by the Company on terms equivalent to those that prevail in arm's-length transactions, observing the price and usual market conditions, therefore these transactions are under terms that are no less favorable to the Company than those arranged with third parties.

Purchases, accounts receivable and other assets, and accounts payable and other liabilities relates largely to amounts charged by joint ventures and associates related to the pelletizing plants lease and railway transportation services.

Information about related party transactions and effects on the financial statements is set out below:

**a) Transactions with related parties**

	Year ended December 31								
	2017			2016			2015		
	Joint Ventures	Associates	Total	Joint Ventures	Associates	Total	Joint Ventures	Associates	Total
Net operating revenue .....	399	337	736	166	346	512	139	353	492
Cost and operating expenses .....	(1,943)	(29)	(1,972)	(916)	(50)	(966)	(815)	(83)	(898)
Financial result .....	118	(14)	104	(29)	(20)	(49)	-	8	8

Net operating revenue relates to sale of iron ore to the steelmakers and right to use capacity on railroads.

Cost and operating expenses mostly relates to the operational leases of the pelletizing plants. Further information in relation to these operational leases is disclosed in note 31.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**30. Related parties (Continued)**

**b) Outstanding balances with related parties**

	December 31, 2017			December 31, 2016		
	Joint Ventures	Associates	Total	Joint Ventures	Associates	Total
<b>Assets</b>						
Accounts receivable .....	73	38	111	69	35	104
Dividends receivable .....	112	14	126	53	20	73
Loans to related parties .....	4,526	-	4,526	-	-	-
Other assets .....	17	-	17	-	-	-
<b>Liabilities</b>						
Supplier and contractors.....	192	20	212	95	11	106
Loans from related parties .....	-	1,245	1,245	-	440	440
Other liabilities.....	612	-	612	359	-	359

In 2017, the loans from/to related parties mainly arose in connection with the transaction of Nacala's corridor business (further information in relation to this transaction is disclosed in note 15). Loans to related parties corresponds to the loan of US\$4,526 to Nacala BV, which carries interest at 7.44% p.a. The loan from related parties mainly relates to the loan from Pangea Emirates Ltd. in the amount of US\$1,166, which carries interest at 6.54% p.a.

**c) The key management personnel remuneration is as follows:**

	Year ended December 31		
	2017	2016	2015
<b>Short-term benefits</b>			
Wages or pro-labor.....	9	8	8
Direct and indirect benefits.....	10	4	6
Profit sharing program ("PLR") .....	10	-	8
	<u>29</u>	<u>12</u>	<u>22</u>
<b>Long-term benefits</b>			
Shares based .....	16	1	1
<b>Severance .....</b>			
	<u>7</u>	<u>5</u>	<u>6</u>
	<u><u>52</u></u>	<u><u>18</u></u>	<u><u>29</u></u>





**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**31. Commitments**

**a) Contractual obligations**

The table below presents the annual minimum future payments, which are required and non-cancelable, related to contractual obligations of the Company as of December 31.

	2018	2019	2020	2021	2022 and thereafter	Total
Operating lease .....	283	192	179	178	221	1,053
Purchase obligations .....	2,191	1,021	686	604	3,761	8,263
<b>Total minimum payments required .....</b>	<b>2,474</b>	<b>1,213</b>	<b>865</b>	<b>782</b>	<b>3,982</b>	<b>9,316</b>

**Operating lease**—Vale has operating lease agreements with its joint ventures Companhia Coreano-Brasileira de Pelotização, Companhia Hispano-Brasileira de Pelotização, Companhia Ítalo-Brasileira de Pelotização and Companhia Nipo-Brasileira de Pelotização (together “pelletizing plants”), in which the Company leases their pelletizing plants. These agreements are renewable and last from 3 up to 10 years. The minimum future payments have been calculated considering that all contracts will be renewed automatically.

The Company also has operating leases for the exploration and processing of iron ore with joint ventures, port operations with third parties and property leases for its operational facilities with third parties.

The total amount of operational leasing expenses for the year ended on December 31, 2017, 2016 and 2015 were US\$664, US\$266 and US\$329, respectively.

**Purchase obligations**—The purchase obligations derive mainly from contracts for the acquisition of fuel, energy and the acquisition of raw materials and services.

**b) Guarantees provided**

As of December 31, 2017, corporate guarantees provided by Vale (within the limit of its direct or indirect interest) for the companies Norte Energia S.A. and Companhia Siderúrgica do Pecém S.A. are US\$378 and US\$1,497, respectively.

The net book value of property, plant and equipment pledged to secure judicial claims on December 31, 2017 and 2016 were US\$15 and US\$35, respectively.

**c) Nickel Operations—Indonesia**

The Company’s subsidiary PT Vale Indonesia Tbk (“PTVI”), a public company in Indonesia, has an agreement in place with the Government of Indonesia to operate its mining licenses and it includes a commitment to divest an additional 20% of PTVI’s shares to Indonesian participants by October 2019 (approximately 20% of PTVI’s shares are already registered on the Indonesian Stock Exchange). The



**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**31. Commitments (Continued)**

existing major shareholders, Vale Canada and Sumitomo Metal Mining, Co., Ltd., will comply with the divestment obligation on a pro rata basis.

**32. Risk management**

Vale considers that an effective risk management is key to support the achievement of the company objectives and to ensure the financial strength and flexibility of the company and the business continuity.

Therefore, Vale has developed its risk management strategy in order to provide an integrated approach of the risks the company is exposed to, considering not only the risks generated by variables traded in financial markets (market risk) and those arising from liquidity risk, but also the risk from counterparties obligations (credit risk) and those relating to inadequate or failed internal processes, people, systems or external events (operational risk), among others.

**a) Risk management policy**

The Board of Directors established a corporate risk management policy defining principles and guidelines applicable to this process in the company and the corresponding governance structure.

This policy determines that corporate risks should be measured and monitored, regularly, in an integrated manner, in order to ensure that the company overall risk level remains aligned with its strategic guidelines.

The Executive Risk Management Committee, created by the Board of Directors, is responsible for supporting the Executive Board in the risk management decisions, issuing opinions and recommendations. It is also responsible for the supervision and revision of the principles and instruments of corporate risk management.

The Executive Board is responsible for the approval of the policy deployment into norms, rules and responsibilities and for reporting to the Board of Directors about such procedures.

The risk management norms and instructions complement the corporate risk management policy and define practices, processes, controls, roles and responsibilities.

The Company may, when necessary, allocate specific risk limits to management activities, including but not limited to, market risk limit, corporate and sovereign credit limit, in accordance with the acceptable corporate risk limit.

**b) Liquidity risk management**

The liquidity risk arises from the possibility that Vale might not perform its obligations on due dates, as well as face difficulties to meet its cash requirements due to market liquidity constraints.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**32. Risk management (Continued)**

See note 20 “Loans, borrowing, cash and cash equivalents and financial investments” for details on the Company’s liquidity risk.

**c) Credit risk management**

Vale’s exposure to credit risk arises 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.

**(i) Commercial credit risk management**

See note 10 “Accounts receivables” for details on commercial credit risk.

**(ii) Treasury credit risk management**

To manage the credit exposure arising from cash investments and derivative instruments, credit limits are approved to each counterparty with whom we have credit exposure.

Furthermore, we control the portfolio diversification and monitor different indicators of solvency and liquidity of the different counterparties that were approved for trading.

**d) Market risk management**

Vale is exposed to the behavior of several market risk factors that can impact its cash flow. The assessment of this potential impact arising from the volatility of risk factors and their correlations is performed periodically to support the decision making process regarding the risk management strategy, that may incorporate financial instruments, including derivatives.

The portfolio of these financial instruments is monitored on a monthly basis, enabling financial results surveillance and its impact on cash flow.

Considering the nature of Vale’s business and operations, the main market risk factors which the Company is exposed to are:

- Foreign exchange and interest rates;
- Product prices and input costs.

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**32. Risk management (Continued)**

**e) Foreign exchange and interest rate risk**

The company's cash flow is subjected to volatility of several currencies, as its products are predominantly priced in US dollar, while most of the costs, disbursements and investments are denominated in other currencies, mainly Brazilian real and Canadian dollar.

In order to reduce the potential impact that arises from this currency mismatch, derivatives instruments may be used as a risk mitigation strategy.

Vale implements hedge transactions to protect its cash flow against the market risks that arise from its debt obligations—mainly currency volatility. The hedges cover most of the debts in Brazilian reals and euros. We use swap and forward transactions to convert debt linked to Brazilian real and Euros into US dollar, with volumes, flows and settlement dates similar to those of the debt instruments—or sometimes lower, subject to market liquidity conditions.

Hedging instruments with shorter settlement dates are renegotiated through time so that their final maturity matches—or becomes closer—to the debts' final maturity. At each settlement date, the results of the swap and forward transactions partially offset the impact of the foreign exchange rate in Vale's obligations, contributing to stabilize the cash disbursements in US dollar.

Vale has also exposure to interest rates risks over loans and financings. The US Dollar floating rate debt in the portfolio consists mainly of loans including export pre-payments, commercial banks and multilateral organizations loans. In general, such debt instruments are indexed to the LIBOR (London Interbank Offer Rate) in US dollar. We take advantage of the potential correlation between commodity prices and U.S. dollar floating interest rates as a partial natural hedge for our cash flow.

**f) Risk of product and input prices**

Vale is also exposed to market risks including commodities price and input price volatilities. In accordance with risk management policy, risk mitigation strategies involving commodities can be used to adjust the cash flow risk profile and reduce Vale's cash flow volatility. For this kind of risk mitigation strategy, Vale uses predominantly forwards, futures or zero-cost collars.

**g) Operational risk management**

The operational risk management is the structured approach that Vale uses to manage uncertainty related to possible inadequate or failure in internal processes, people, systems and external events, in accordance with the principles and guidelines of ISO 31000.

The main operational risks are periodically monitored, ensuring the effectiveness of preventive and mitigating key controls in place and the execution of the risk treatment strategy (implementation of new or improved controls, changes in the risk environment, risk sharing by contracting insurance, provisioning of resources, etc.).

**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

### **32. Risk management (Continued)**

Therefore, the Company seeks to have a clear view of its major risks, the best cost-benefit mitigation plans and the effectiveness of the controls in place, monitoring the potential impact of operational risk and allocating capital efficiently.

#### **h) Capital management**

The Company's policy aims at establishing a capital structure that will ensure the continuity of your business in the long term. Within this perspective, the Company has been able to deliver value to stockholders through dividend payments and capital gain, and at the same time maintain a debt profile suitable for its activities, with an amortization well distributed over the years, thus avoiding a concentration in one specific period.

#### **i) Insurance**

Vale contracts several types of insurance policies, such as operational risk policy, engineering risks insurance (projects), civil responsibility, life insurance policy for their employees, among others. The coverage of these policies is similar to the ones used in general by the mining industry and is issued in line with the objectives defined by the Company, with the corporate risk management policy and the limitation imposed by the insurance and reinsurance global market. In general, the company's assets directly related with its operations are included in the coverage of insurance policies.

Insurance management is performed with the support of existing insurance committees in the various operational areas of the Company. Among the management instruments, Vale uses captive reinsurance to balance the price on reinsurance contracts with the market, as well as, enable direct access to key international markets of insurance and reinsurance.

### **33. Additional information about derivatives financial instruments**

#### **a) Sensitivity analysis of derivative financial instruments.**

The following tables present the potential value of the instruments given hypothetical stress scenarios for the main market risk factors that impact the derivatives positions. The scenarios were defined as follows:

- *Probable*: the probable scenario was based on the estimated risk variables that were used on pricing the derivative instruments as at December 31, 2017.
- *Scenario I*: fair value estimated considering a 25% deterioration in the associated risk variables
- *Scenario II*: fair value estimated considering a 50% deterioration in the associated risk variables



**Notes to the Financial Statements (Continued)**  
**Expressed in millions of United States dollar, unless otherwise stated**

**33. Additional information about derivatives financial instruments (Continued)**

The curves used on the pricing of derivatives instruments were developed based on data from B3 S.A., Central Bank of Brazil, London Metals Exchange and Bloomberg.

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**33. Additional information about derivatives financial instruments (Continued)**

Instrument	Instrument's main risk events	Probable	Scenario I	Scenario II
CDI vs. US\$ fixed rate swap	R\$ depreciation	(33)	(300)	(567)
	US\$ interest rate inside Brazil decrease	(33)	(42)	(53)
	Brazilian interest rate increase	(33)	(35)	(37)
Protected item: R\$ denominated debt	R\$ depreciation	n.a.	–	–
TJLP vs. US\$ fixed rate swap	R\$ depreciation	(380)	(705)	(1,029)
	US\$ interest rate inside Brazil decrease	(380)	(395)	(409)
	Brazilian interest rate increase	(380)	(405)	(427)
	TJLP interest rate decrease	(380)	(403)	(425)
Protected item: R\$ denominated debt	R\$ depreciation	n.a.	–	–
TJLP vs. US\$ floating rate swap	R\$ depreciation	(54)	(83)	(112)
	US\$ interest rate inside Brazil decrease	(54)	(54)	(56)
	Brazilian interest rate increase	(54)	(55)	(57)
	TJLP interest rate decrease	(54)	(55)	(56)
Protected item: R\$ denominated debt	R\$ depreciation	n.a.	–	–
R\$ fixed rate vs. US\$ fixed rate swap	R\$ depreciation	25	(57)	(138)
	US\$ interest rate inside Brazil decrease	25	13	1
	Brazilian interest rate increase	25	(2)	(25)
Protected item: R\$ denominated debt	R\$ depreciation	n.a.	–	–
IPCA vs. US\$ fixed rate swap	R\$ depreciation	(34)	(150)	(266)
	US\$ interest rate inside Brazil decrease	(34)	(39)	(44)
	Brazilian interest rate increase	(34)	(50)	(64)
	IPCA index decrease	(34)	(43)	(52)
Protected item: R\$ denominated debt	R\$ depreciation	n.a.	–	–
IPCA vs. CDI swap	Brazilian interest rate increase	85	53	25
	IPCA index decrease	85	67	50
Protected item: R\$ denominated debt linked to IPCA	IPCA index decrease	n.a.	(67)	(50)
EUR fixed rate vs. US\$ fixed rate swap	EUR depreciation	23	(158)	(338)
	Euribor increase	23	15	8
	US\$ Libor decrease	23	6	(12)
Protected item: EUR denominated debt	EUR depreciation	n.a.	158	338
<b>Bunker Oil protection</b>				
Forwards and options	Bunker Oil price decrease	–	–	–
Protected item: Part of costs linked to bunker oil prices	Bunker Oil price decrease	n.a.	–	–
<b>Nickel sales fixed price protection</b>				
Forwards	Nickel price decrease	24	(6)	(37)
Protected item: Part of nickel revenues with fixed prices	Nickel price fluctuation	n.a.	6	37
<b>Purchase protection program</b>				
Nickel forwards	Nickel price increase	(0)	(1)	(2)
Protected item: Part of costs linked to nickel prices	Nickel price increase	n.a.	1	2
Copper forwards	Copper price increase	(0.0)	(0.2)	(0.3)
Protected item: Part of costs linked to copper prices	Copper price increase	n.a.	0.2	0.3
WPM warrants	WPM stock price decrease	39	19	6
Conversion options—VLI	VLI stock value increase	(57)	(92)	(137)
Options—MBR	MBR stock value decrease	251	150	74
Instrument	Main risks	Probable	Scenario I	Scenario II
Embedded derivatives—Raw material purchase (nickel)	Nickel price increase	1	(7)	(14)
Embedded derivatives—Raw material purchase (copper)	Copper price increase	0	(5)	(9)
Embedded derivatives—Gas purchase	Pellet price increase	(2)	(4)	(7)
Embedded derivatives—Guaranteed minimum return (VLI)	VLI stock value decrease	(133)	(262)	(472)

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**33. Additional information about derivatives financial instruments (Continued)**

**b) Financial counterparties' ratings**

The transactions of derivative instruments, cash and cash equivalents as well as investments are held with financial institutions whose exposure limits are periodically reviewed and approved by the delegated authority. The financial institutions credit risk is performed through a methodology that considers, among other information, ratings provided by international rating agencies.

The table below presents the ratings in foreign currency published by agencies Moody's and S&P regarding the main financial institutions that we had outstanding positions as of December 31, 2017.

Long term ratings by counterparty	Moody's	S&P
ANZ Australia and New Zealand Banking .....	Aa3	AA-
Banco ABC .....	Ba3	BB
Banco Bradesco .....	Ba3	BB
Banco do Brasil .....	Ba3	BB
Banco de Credito del Peru .....	Baa1	BBB+
Banco do Nordeste .....	Ba3	BB
Banco Safra .....	Ba3	BB
Banco Santander .....	A3	A-
Banco Votorantim .....	Ba3	BB
Bank of America .....	A3	A-
Bank of China .....	A1	A
Bank of Mandiri .....	Baa3	BB+
Bank of Nova Scotia .....	A1	A+
Bank Rakyat .....	Baa3	BB+
Bank of Tokyo Mitsubishi UFJ .....	A1	A-
Banpará .....	-	BB-
Barclays .....	Baa2	BBB
BBVA .....	A3	BBB+
BNP Paribas .....	A2	A
BTG Pactual .....	Ba3	BB-
Caixa Economica Federal .....	Ba3	BB
Canadian Imperial Bank .....	A1	A+
China Construction Bank .....	A1	A
Citigroup .....	Baa1	BBB+
Credit Agricole .....	A1	A
Credit Suisse .....	Baa2	BBB+
Deutsche Bank .....	A3	A-
Goldman Sachs .....	A3	BBB+
HSBC .....	A2	A
Intesa Sanpaolo Spa .....	A3	BBB
Itaú Unibanco .....	Ba3	BB
JP Morgan Chase & Co .....	A3	A-
Macquarie Group Ltd .....	A3	BBB
Mizuho Financial .....	A1	A-
Morgan Stanley .....	A3	BBB+
National Australia Bank NAB .....	Aa3	AA-
National Bank of Oman .....	Baa3	-
Rabobank .....	Aa2	A+
Royal Bank of Canada .....	A1	AA-
Societe Generale .....	A2	A
Standard Bank Group .....	Ba1	-
Standard Chartered .....	A2	BBB+
Sumitomo Mitsui Financial .....	A1	A-
UBS .....	Aa3	A-
Unicredit .....	Baa1	BBB



**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**33. Additional information about derivatives financial instruments (Continued)**

**c) Market curves**

**(i) Products**

**Nickel**

Maturity	Price (US\$/ton)	Maturity	Price (US\$/ton)	Maturity	Price (US\$/ton)
SPOT	12,260	JUN18	12,833	DEC18	12,960
JAN18	12,725	JUL18	12,857	DEC19	13,167
FEB18	12,745	AUG18	12,878	DEC20	13,354
MAR18	12,767	SEP18	12,896	DEC21	13,454
APR18	12,789	OCT18	12,920		
MAY18	12,812	NOV18	12,940		

**Copper**

Maturity	Price (US\$/lb)	Maturity	Price (US\$/lb)	Maturity	Price (US\$/lb)
SPOT	3.30	JUN18	3.30	DEC18	3.32
JAN18	3.28	JUL18	3.31	DEC19	3.33
FEB18	3.28	AUG18	3.31	DEC20	3.33
MAR18	3.29	SEP18	3.31	DEC21	3.33
APR18	3.29	OCT18	3.31		
MAY18	3.30	NOV18	3.31		

**Bunker Oil**

Maturity	Price (US\$/ton)	Maturity	Price (US\$/ton)	Maturity	Price (US\$/ton)
SPOT	375	JUN18	374	DEC18	364
JAN18	376	JUL18	372	DEC19	303
FEB18	376	AUG18	371	DEC20	277
MAR18	376	SEP18	369	DEC21	255
APR18	375	OCT18	368		
MAY18	375	NOV18	366		

**(ii) Foreign exchange and interest rates**

**US\$—Brazil Interest Rate**

Maturity	Rate (% p.a.)	Maturity	Rate (% p.a.)	Maturity	Rate (% p.a.)
01/02/18	2.86	11/01/18	2.77	01/04/21	3.19
02/01/18	4.04	12/03/18	2.71	04/01/21	3.22
03/01/18	3.27	01/02/19	2.82	07/01/21	3.26
04/02/18	2.96	04/01/19	2.85	10/01/21	3.31
05/02/18	2.84	07/01/19	2.91	01/03/22	3.42
06/01/18	2.78	10/01/19	2.94	04/01/22	3.43
07/02/18	2.73	01/02/20	3.02	07/01/22	3.44
08/01/18	2.72	04/01/20	3.03	10/03/22	3.48
09/03/18	2.69	07/01/20	3.06	01/02/23	3.60
10/01/18	2.71	10/01/20	3.13	07/03/23	3.65

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**33. Additional information about derivatives financial instruments (Continued)**

**US\$ Interest Rate**

<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>
1M	1.57	6M	1.83	11M	1.90
2M	1.62	7M	1.85	12M	1.90
3M	1.70	8M	1.87	2Y	2.11
4M	1.77	9M	1.88	3Y	2.23
5M	1.81	10M	1.89	4Y	2.29

**TJLP**

<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>
01/02/18	7.00	11/01/18	7.00	01/04/21	7.00
02/01/18	7.00	12/03/18	7.00	04/01/21	7.00
03/01/18	7.00	01/02/19	7.00	07/01/21	7.00
04/02/18	7.00	04/01/19	7.00	10/01/21	7.00
05/02/18	7.00	07/01/19	7.00	01/03/22	7.00
06/01/18	7.00	10/01/19	7.00	04/01/22	7.00
07/02/18	7.00	01/02/20	7.00	07/01/22	7.00
08/01/18	7.00	04/01/20	7.00	10/03/22	7.00
09/03/18	7.00	07/01/20	7.00	01/02/23	7.00
10/01/18	7.00	10/01/20	7.00	07/03/23	7.00

**BRL Interest Rate**

<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>
01/02/18	6.89	11/01/18	6.74	01/04/21	9.06
02/01/18	6.90	12/03/18	6.80	04/01/21	9.24
03/01/18	6.82	01/02/19	6.87	07/01/21	9.40
04/02/18	6.76	04/01/19	7.11	10/01/21	9.55
05/02/18	6.73	07/01/19	7.41	01/03/22	9.66
06/01/18	6.71	10/01/19	7.78	04/01/22	9.75
07/02/18	6.66	01/02/20	8.07	07/01/22	9.84
08/01/18	6.67	04/01/20	8.38	10/03/22	9.92
09/03/18	6.70	07/01/20	8.63	01/02/23	9.99
10/01/18	6.72	10/01/20	8.88	07/03/23	10.12

**Implicit Inflation (IPCA)**

<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>
01/02/18	4.27	11/01/18	4.12	01/04/21	4.72
02/01/18	4.27	12/03/18	4.18	04/01/21	4.75
03/01/18	4.20	01/02/19	4.24	07/01/21	4.78
04/02/18	4.14	04/01/19	4.33	10/01/21	4.81
05/02/18	4.11	07/01/19	4.52	01/03/22	4.82
06/01/18	4.09	10/01/19	4.57	04/01/22	4.82
07/02/18	4.04	01/02/20	4.62	07/01/22	4.84
08/01/18	4.05	04/01/20	4.66	10/03/22	4.85
09/03/18	4.08	07/01/20	4.69	01/02/23	4.87
10/01/18	4.10	10/01/20	4.72	07/03/23	4.91

**Notes to the Financial Statements (Continued)**  
Expressed in millions of United States dollar, unless otherwise stated

**33. Additional information about derivatives financial instruments (Continued)**

**EUR Interest Rate**

<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>
1M	-0.41	6M	-0.30	11M	-0.26
2M	-0.39	7M	-0.29	12M	-0.26
3M	-0.38	8M	-0.28	2Y	-0.15
4M	-0.34	9M	-0.27	3Y	0.01
5M	-0.32	10M	-0.27	4Y	0.15

**CAD Interest Rate**

<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>	<u>Maturity</u>	<u>Rate (% p.a.)</u>
1M	1.45	6M	1.73	11M	0.99
2M	1.48	7M	1.49	12M	0.91
3M	1.55	8M	1.31	2Y	2.09
4M	1.64	9M	1.19	3Y	2.22
5M	1.70	10M	1.07	4Y	2.30

**Currencies—Ending rates**

CAD/US\$	0.7961	US\$/BRL	3.3080	EUR/US\$	1.1953
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