



2016 Sustainability Report



Foreword

To commemorate a decade of publishing annual reports, which are prepared based on the guidelines of the Global Reporting Initiative (GRI), completed in 2016, Vale dedicates, in this edition, a section to highlight the main news and events that have occurred in the last ten years. Entitled “Ten-year Trajectory”, the chapter reveals the Vale’s successful journey towards sustainable development.

And also presents the main results of 2016.



Also visit www.vale.com/rs2016
and watch the video with the main highlights.

This document may include statements that present Vale’s expectations about events or results. All statements, when based upon expectations, involve risks and uncertainties. Thus, Vale cannot guarantee that these will materialize. The risks and uncertainties include factors related to the following: (a) the countries where the Company holds operations, especially Brazil and Canada; (b) the global economy; (c) the capital markets; (d) operational incidents or accidents, (e) the mining and metals prices and their dependence on global industrial production, which is cyclical by nature; and (f) global competition in the markets in which Vale operates. To obtain further information on factors that may lead to different results from those estimated by Vale, there are available for consultation reports Vale files with the Brazilian Comissão de Valores Mobiliários (CVM) the U.S. Securities and Exchange Commission (SEC), the French Autorité des Marchés Financiers (AMF) and in particular the factors discussed under “Forward-Looking Statements” and “Risk Factors” in Vale’s annual report on Form 20-F.



For more information, please go to Vale’s
annual report – Form 20F at vale.com

About this report



Introduction

This 2016¹ report, is a milestone for Vale, and marks the tenth anniversary of the publication, whose objective is to show stakeholders its achievements and difficulties, its challenges and advances, in the economic, social, and environmental spheres, in a demonstration of transparency and commitment to accountability to society. (See the publication's highlights of the past decade on page 06). [G4-28](#)

In order to report the Vale's performance over the year, this report, as well as the one for 2015 – published in June of the following year – is based on the guidelines of the Global Reporting Initiative (GRI), version G4, comprehensive option. Like the previous document, there have been no relevant changes to already published data referring to previous periods. To ensure comparability, the content maintains a historical series of three fiscal years, when applicable. [G4-13](#) | [G4-22](#) | [G4-23](#) | [G4-29](#) | [G4-30](#) | [G4-31](#) | [G4-32](#)

In addition to the GRI indicators calculated from the Materiality Matrix revision process, the report also adopts indicators from the Mining and Minerals Sector Supplement. All are distributed in five large blocks that depict the guidelines of Vale's Sustainability Policy, updated in 2016: Business, Health and Safety, Local Development, Social Strengthening, and Environmental Responsibility Vision (check the organization in the Material Themes scheme at the end of this text). At the opening of each block is the correlation with the internal sustainability policy, as well as with the Sustainable Development Goals (SDGs) and the United Nations Global Pact².

The report was submitted to external verification, the statement of which is on [page 144](#), by independent auditing firm Bureau Veritas Certification – Brasil. [G4-33](#)

Materiality [G4-18](#) | [G4-19](#) | [G4-20](#) | [G4-21](#) | [G4-24](#) | [G4-25](#) | [G4-26](#) | [G4-27](#)

In 2016, Vale promoted the third cycle of the revision process for the material themes on which this document will be based on. It was aligned with GRI G4 guidelines, meeting the four principles that guide the definition of the content of a sustainability report: the context of sustainability, the inclusion of stakeholders, materiality and completeness. The preparation of this review also took into account the analysis of the Impact and Influence axes, where in the first one the degree of relevance of the material themes for the organization, and the probability of a negative impact or opportunity to generate positive impacts, growth, and long-term advantage was taken into account. The Influence axis, on the other hand, took into account the degree of relevance of the material themes for stakeholders and their perception and expectations regarding possible impacts and action, and the organization's response and mitigation capacity.

For the Impact axis, the results of queries made in face-to-face engagement panels for the materiality process and for the 2016 annual report were covered. The panels were held at the corporate headquarters in Rio de Janeiro (RJ) and at one unit in Belo Horizonte (MG), with the participation of the internal public.

For the influence axis, sustainability, mining, and domestic and international market specialists were interviewed, in addition to media studies, analysis of three competitors, and evaluation of megatrends and domestic and international perspectives.

As a result of this revision, in addition to the studies conducted, nine material themes of greater relevance to Vale's operations were highlighted by the internal and external publics consulted. The addition of four other themes occurred in the phase of validating the results with the Governance and Sustainability Committee. They include: Attraction, development and retention of professionals; Management of business and operational risks; Legal and regulatory management and global positioning; and Management of energy resources.

Priority themes were grouped into five lead blocks, containing 76 indicators, including sectoral ones. The impact location analysis according to GRI G4 guidelines was carried out through the face-to-face panels and interviews, resulting inside and outside the organization. (The correlation of the material themes with the GRI aspects is exposed on [page 141](#), in the Glossary).

1. Any difference in total data and percentages in charts and tables should be attributed to the rounding of values. Throughout the report, the amounts in Reais were converted to American dollars at a rate of R\$3.49.

In view of the complexity of our activities, Vale does not have a single business unit criterion. Therefore, some indicators are not expressed as a percentage in comparison to business unit figures.

2. The Sustainability Reports performs the role of Communication on Progress (COP) as part of the Global Compact.



To address questions and submit comments or suggestions, please contact channel Contact Us at: www.vale.com [G4-31](#).

Business Vision

Ethics, integrity, and transparency in various relations

Legal and regulatory management and global positioning

Business and operational risk management

Local Development

Management of the environmental, social, and economic impacts of territorial operations

Environmental Responsibility

Waste and tailings management

Biodiversity

Use of water resources

Use of energy resources

Mitigation, adaptation, and resilience to climate change

Health and Safety

Correlation with the Sustainability Policy

Social Strengthening

Dialogue and engagement with stakeholders

Attracting, developing, and retaining professionals

Respect for human rights

Report scope (Boundary)

In order to define the content and scope of this document, in line with the methodology of Material Aspects and Limits, Vale relies on the Materiality Matrix resulting from the mapping of indicators. The work took into account the expectations and interests of representatives of stakeholders in relation to significant economic-financial and socio-environmental impacts³. The ability of the themes to influence assessments and decisions on investments was also taken into account.

As for coverage, the report includes information on the performance of the companies over which Vale has control and holds a share percentage greater than 50%. References to "Vale" or the "Company" in this report generally are limited to Vale S.A. and to its controlled subsidiaries. Whenever a controlled subsidiary is specifically mentioned in this report, the information provided with regard to such entity shall be limited to it only. Having sold its Coal assets in Australia, the Vale herein considers the results of the operation only until the third quarter of 2016. Although this year it also initiated the process of discontinuing a great portion of its fertilizers business and, therefore, having considered fertilizers operations discontinued in financial reports, the division's performance is wholly taken into account, as the sale of assets will occur in 2017 (learn more about this in the 20-F Report and in the Investors section at www.vale.com). **G4-17**

Regarding subsidiaries Vale controls, Vale's aim to ensure their policies and standards are implemented, in accordance with applicable local legislation, aligned to Vale internal policies and standards.

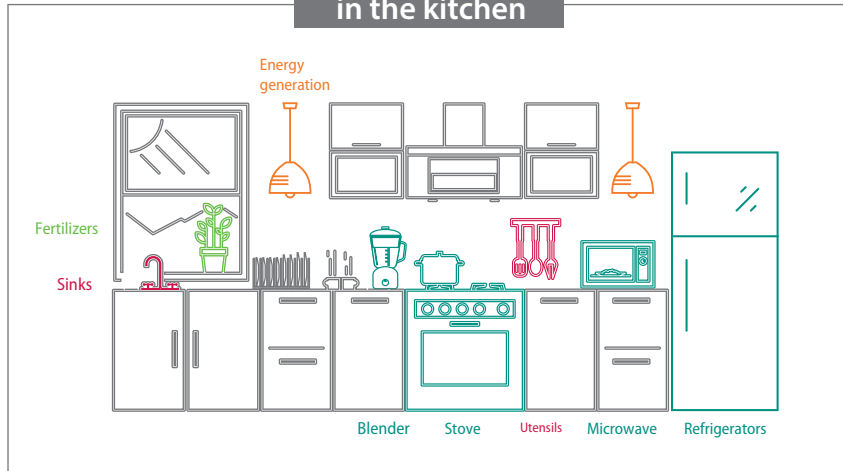
In some directly or indirectly affiliated companies, of which Vale (i) holds between 20% and 50% of voting capital or (ii) holds more than 50%, but without controlling them, including shared control, Vale expects such companies to implement recommend policies and standards implementation in line with its own. Although, due to the lack of control, Vale cannot guarantee that these companies will fully comply with Vale's standards, controls and procedures.

³ The scope of the operations covered in each indicator may vary. In the case of projects, socio-environmental, resettlement, socio-economic studies, human resources, health and safety, and biodiversity expenditures are taken into account. The most relevant characteristics are presented throughout the report.

Vale is a part of your life

■ Iron ore ■ Nickel ■ Coal ■ Manganese ■ Copper ■ Potassium, phosphates and nitrogenous compounds (Fertilizers)

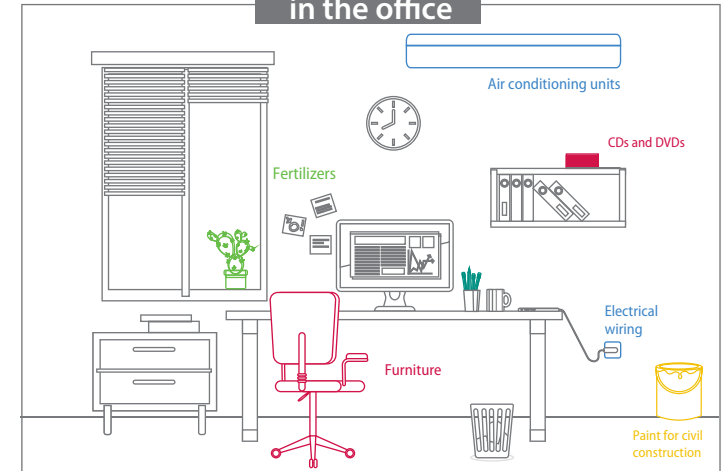
in the kitchen



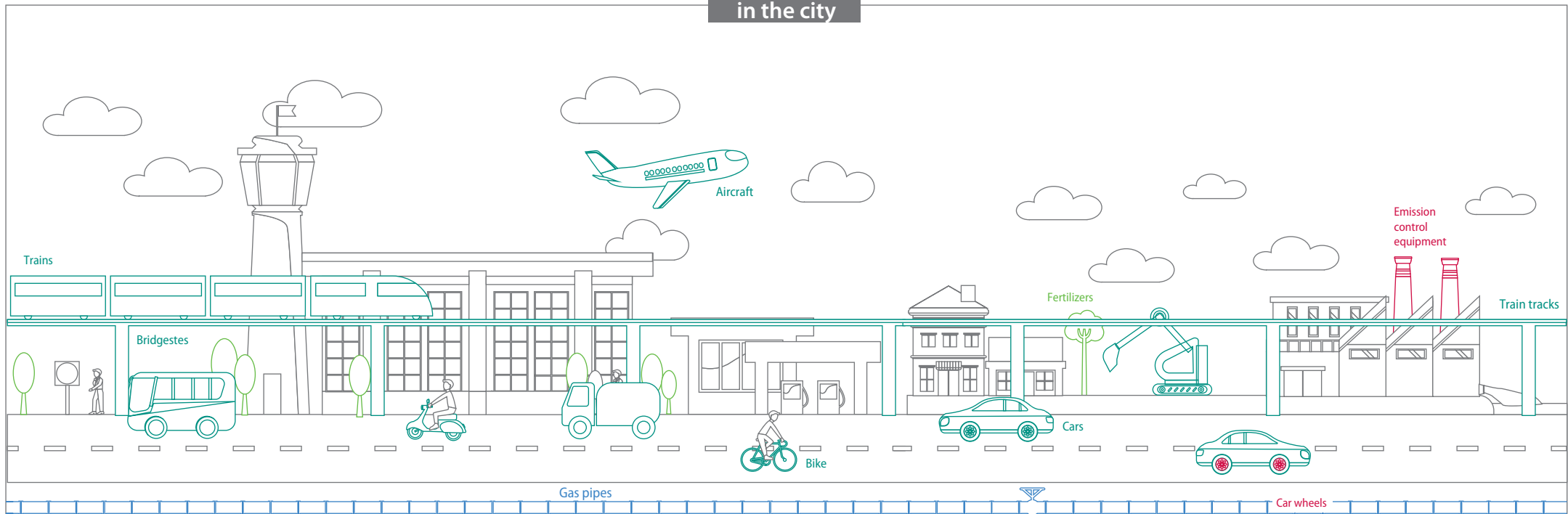
within yourself



in the office



in the city



Trajectory: Ten years of Vale's Sustainability Reports



2007

Vale's first Sustainability Report

In the publication, then GRI G3, with a B+ application level, Vale sought to portray the state of its management and performance practices. The Vale's commitment has always been to seek continuous improvement, using diagnostics as a basis for defining necessary policies, action plans and targets, promoting transformation towards excellence in sustainability.

Brand change

In 2007, Vale took on the name by which it was already popularly known. Companhia Vale do Rio Doce became known simply as Vale. This was the end of different brands for its various areas. Easy visual reading further reinforced Vale's image as a global company.

United Nations Global Compact

Vale became a signatory of the United Nations Global Compact, a program comprising of ten principles in the areas of environment, human rights, and anti-corruption.

2008

Recognized by UNESCO

The Vale Natural Reserve was recognized by UNESCO as a World Natural Heritage Site of the Discovery Coast and Advanced Outpost of the Atlantic Forest Reserve. Located in Espírito Santo, with 22,000 hectares of land, the reserve is a true open-air laboratory. Scientists of various specialties and other researchers study the complexity of this Brazilian biome and work for the conservation and multiplication of its diversity. The focuses of the studies are the sustainable use and conservation of natural resources, and the creation of technologies to recover degraded areas, in Brazil and around the world.

Management of emissions

In 2008, Vale became the only Vale in Latin America to be listed in the Carbon Disclosure Leadership Index, and was also the mining Vale with the best rating in the indicator that measures carbon emissions per revenue. This recognition is the result of various actions undertaken in previous years, especially the creation of the Corporate Guidelines on Climate Change and Carbon, and the Vale Carbon Program.

Trajectory: Ten years of Vale's Sustainability Reports



2009

Efforts beyond the operations

The Vale Fund for Sustainable Development, a non-profit institution, was created by Vale with the goal of promoting sustainable development, and to reconcile the preservation and conservation of the environment with improved socio-economic conditions in developing countries.

Its efforts in regards to the central issues of sustainability are made through the support for transformative programs that seek solutions to combat deforestation and forest degradation, in addition to ensuring the socio-economic development of the populations, providing improvements in physical and institutional infrastructure. Through partnerships established with NGOs, the Vale Fund works in projects focused on three main issues: Strategic Monitoring of the Legal Amazon, Consolidation and Creation of Protected Areas, and the Promotion of Green Municipalities.

ITV

This year, the Instituto Tecnológico Vale (ITV) was created, whose goal is to coordinate scientific and technological actions, with an emphasis on long-term research developed in partnership with scientific communities in the domestic and international sphere.

Technology for the environment

Vale installs the first wind fence in Tubarão, Espírito Santo. The technology was implemented around yards to reduce wind speed and to prevent it from dragging particulate matter from piles of iron ore, pellets, and coal. The wind fences are made up of a metallic structure that is closed off by polypropylene screens that can withstand winds of up to 120 km/h. In all, there are nine kilometers of fencing, which corresponds to three times the length of the Third Bridge, which connects Vitória to Vila Velha.

2010

Commitment made

Vale's Sustainability Action Plan (PAS) aims to establish targets and actions for performance improvement related to sustainability in issues such as fuel inputs, consumption and recirculation of water, waste generation and disposal, mine closure, local development and human resources. In 2010, the Vale included PAS targets as one of the criteria for Variable Remuneration of some of its Brazilian operations, such as iron ore, pelletizing, logistics, manganese, copper, and potash. This action reaffirmed the commitment of the areas with the permanent improvement of the results and with the advance of sustainability management at Vale.

Great Brazilian exporter

Vale made a great commercial leap in 2010, as measured by the volume of its exports. In the period, the Company, alone, exported approximately US\$29 billion net, resulting from the sum of the Vale's exports and discounting the aggregate of its imports. Despite 2010 having been a record year, Vale's importance as a large domestic exporter would be confirmed throughout the entire decade.

Vale's Sustainability Report

The Vale Sustainability Report receives the GRI Choice Award in the Civil Society category. In addition to this, the Vale is listed among the five best in the world in the Investors and General Winner categories.

Trajectory: Ten years of Vale's Sustainability Reports



2011

First coal continues its journey

The first product of the Moatize mine left Mozambique on September 14, 2011 aboard the Orion Express ship heading for Lebanon. It was carrying 35,000 metric tons of thermal coal, which covered the 575 kilometers of the Sena-Beira line, which connects Moatize to Porto da Beira in Sofala, in central Mozambique. The line was cut off 28 years ago due to civil war. The activities in the mine began in May 2011, and its implementation contributed to boosting the economy of Mozambique, generating employment and income.

Biopalma

In a further step to associate diversified investments with environmental actions, Vale announced the purchase of Amazônia S.A. in Pará, on February 1, 2011. All of the areas used in the cultivation of oil palms were mapped and demarcated by the Federal Government as degraded areas. As part of Vale's strategy, Biopalma contributes to the preservation of green areas and to the recovery of deteriorated areas. In addition, the purpose of the family agriculture program was to cover two thousand families in the Vale do Acará and Baixo Tocantins regions, including the production of palm oil on their properties, with the assistance of agricultural practices and the guarantee of purchase by the Company.

Gender equity

With the goal of helping to reduce historical and cultural differences regarding women in the job market, Vale created the Gender Equity Project, in which one of the main proposals is to recognize and promote female talent.

2012

On nature's side

Vale protects or helps to protect 13.7 thousand km² of environmental conservation units (in partnership with local governments), an area approximately nine times bigger than the city of São Paulo, in Brazil. The total size of the protected areas is three times larger than the total area of the Vale's operating units, or 4.7 thousand km².

Carbon Target

The commitment made was to reduce Greenhouse Gas emissions by 5% by 2020.

70-year trajectory

In 2012, Vale reached 70 years of history. The Company, whose initial objective was to produce 1.5 million tons of iron ore, exceeded, just before its anniversary, in 2012, the mark of 5 billion tons of iron ore produced, which would sustain more than two years of steel production in the world, 1.5 billion tons of crude steel. The mining Vale born in the small town of Itabira, Minas Gerais, grew, advanced with its operations around the world, accumulated experience and bet on new challenges in order to face the future ahead.

Oman

Vale opened a pelletizing plant and distribution center in the Sohar Port Industrial Complex, in Oman. The Salobo copper mine in Marabá, Pará also went into operation.

Reconhecimento internacional

Vale was recognized as one of the 100 most sustainable companies in the world, joining the Global 100 ranking, organized by Canada's Corporate Knights, in the aspects of energy use, CO₂ emissions, innovation, and health and safety.

Trajectory: Ten years of Vale's Sustainability Reports



2013

Fight against malaria

For three years, Vale has allocated US\$3 million for actions to fight malaria that are developed by institutions in Mozambique and Malawi, in Africa. In 2013, the Vale became a signatory of the Global Fund to Fight AIDS, Tuberculosis and Malaria, supported by the United Nations (UN).

More modern, safer, and more efficient

The Tubarão Port in Vitória (ES) has invested almost R\$2 billion to prepare for future challenges. The work included two great projects: the modernization of the electrical system and the replacement of yard machines for more modern and efficient versions. The goal was to increase the safety, and the energy and operational efficiency of the port without the need for physical expansion.

Vale-China connection

Vale celebrated the 40th anniversary of the first shipment of iron ore to China and a long-term partnership with Asian clients. Vale made its first sale of iron ore to the country in July 1973. Two shipments were made that year, totaling 46,000 metric tons. The shipments departed from the Port of Atalaia, in Vitória (ES), bound for the port of Tianjin.

2014

Day of Reflection

With the first edition in 2011, around 150,000 employees and subcontractors mobilized on Health and Safety Reflection Day in 2014 to remember casualties and to intensify collective efforts to achieve zero harm.

Here comes the train

The year 2014 began with many novelties for users of the Passenger Trains on the Vitória-Minas Railroad. With an investment of US\$80.2 million, Vale renewed the fleet of railcars that traveled between the states of Minas Gerais and Espírito Santo. In all, 56 new railcars were added: ten for business class and 30 for economy class, in addition to railcars that would become restaurants, diners, generators, and railcars adapted to the handicapped.

Trajectory: Ten years of Vale's Sustainability Reports



2015

First Biofactory

Vale implemented the first biofactory that focused on the preservation of vegetable biodiversity, and was initially dedicated to the reproduction of orchids, bromeliads, cacti, grass, and native trees of the Quadrilátero Ferrífero (region located in the center-south of Minas Gerais state). There are 600,000 seedlings from 63 different types of species in development.

Failure of the Samarco dam

November 5, 2015 made mining history as a sad milestone. The failure of the Samarco's Fundão dam in Mariana (MG), of which Vale is a shareholder together with BHP Billiton, resulted in 18 deaths, as well as a missing person, and displaced various families. From the outset, Vale has strived to support Samarco in taking care of the affected people and to offer all of the necessary efforts to minimize environmental impacts. The Vale provided human and material resources, such as a helicopter and emergency equipment to assist in rescue efforts, water distribution, and the removal of people displaced by the accident from the areas of risk.

2016

50th anniversary of the Tubarão Port

Since its foundation on April 1, 1966, the Tubarão Port has always been at the forefront of Brazilian port activities. Its capacity was unusual for the time: it could receive ships with a capacity of 150,000 metric tons, when the common sizes at the time were vessels of up to 60,000. Tubarão was the driving force behind Vale's efforts in Espírito Santo, and for the state to cease essentially being a coffee producer and to consolidate industrial and commercial activities. With the implementation of pelletizing plants, the port turned into a complex. Today, the world's largest producer of pellets receives approximately 1,200 ships per year. Among these ships are the largest bulk carriers, with a shipping capacity of up to 400,000 metric tons.

30 years on the rails

The Carajás Railroad (EFC) connects Parauapebas (PA) to São Luís (MA), passing 25 locations, between settlements and municipalities. In addition to transporting ore from operations in Pará to the Ponta da Madeira Maritime Terminal to be shipped to clients, a passenger train also circulates on the EFC line. In operation since 1986, the railroad offers train tickets that are up to 50% cheaper than bus tickets, and it is the preferred method of transportation for around 350,000 users per year.

Ponta da Madeira, the largest port in the world

With 30 years of operation, the Ponta da Madeira Maritime Terminal has had its history marked by growth thanks to the commitment and dedication of its employees. Leading Brazil's cargo handling ranking, the terminal is undergoing a capacity expansion to meet increased production resulting from the S11D project, which will transform it into the world's largest port.

New paths for mining

The largest iron ore mining project in Vale's history and the largest private investment in Brazil this decade entered production: the Eliezer Batista S11D Complex. S11D is strategic for the Vale to be able to increase its competitiveness and to maintain leadership in the global iron ore market. The venture, which carries state-of-the-art technologies in its operation, was carefully planned to achieve operational excellence, and while respecting communities and the environment.

US\$12.2 billion

Operational cash generation, as measured by adjusted EBITDA, which represents a 72% increase from the US\$7.1 billion in 2015, mainly due to the better results of the EBITDA from:



Iron Ore

US\$10.5 billion



Base Metal

US\$1.8 billion

page 34

US\$5.5 billion

Sum of investments directed to growth and maintenance.

page 36

US\$4.0 billion

Net income obtained in the year. **page 34**

Business Vision

2016

was marked by production records

Iron Ore: 348.8 Mt – Record achieved in Carajás
Nickel: 311.000 t – Record achieved in Vale Nova Caledônia
Copper: 453.000 t – Record achieved in Salobo **page 33**

Movement for Integrity

It disseminates the importance of the value of “Acting correctly” and became part of the Vale’s annual agenda as an event to reflect on ethics and integrity. **page 31**

1.9

Total injury rate in 2016, which shows a decline compared to the previous period, of 2.2. [page 57](#)

Good practices

In the year, 120 initiatives were Certified as Good Health and Safety Practices, which means that these practices were already tested, and have proven to contribute to reducing risks, and, consequently, to a safer environment. [page 51](#)

62%

Reduction of the medium and low risks of services in the Abóbora Mine, in the Vargem Grande Complex, MG - Brazil, resulting from the Ecological Walkway for Electrical Cables – PEC project. [page 51](#)

US\$ 2.7 million

Was invested into Health campaigns, programs, and initiatives involving Vale employees and subcontractors in 14 countries, in line with the Sustainable Development Goals (SDGs) – including the third goal: “Ensuring healthy lives and promoting the well-being for all at all ages”. [page 53](#)

Health and Safety

Respect to Life

“Life matters most” permeates Vale’s activities, which strives to achieve Zero Damage by investing in prevention, process standardization, risk management, and in the Genuine Active Care culture – a concept which includes care for oneself, care for others, and allowing others to take care for you. [page 50](#)



70%

Local hiring index in 2016. Taking into account only members of senior management from the local community, the indicator was

43%.

[page 69](#)

US\$16 million

Amount allocated to the Vale Foundation in 2016, of which 42% were directly contributed by the operational areas. [page 73](#)

Demobilization of assets

Throughout the period, Vale developed 21 progressive asset demobilization activities, in which approximately US\$15.1 million were invested in the definitive recovery of degraded areas, projects and actions for decommissioning industrial facilities. [page 76](#)

Local Development

1.9 thousand

Total number of kilometers of railroad operated by Vale, equivalent to 6.3% of the total amount installed in the Country, through the Carajás Railroad (EFC), which is **997 kilometers** in length, and the Vitória to Minas Railroad (EFVM), which is **905 kilometers** in length. [page 67](#)

Human rights

In terms of improvements achieved in 2016, the Vale became a member of the **Voluntary Principles on Security and Human Rights**, an initiative that guides companies and governments on human rights in security activities. [page 101](#)

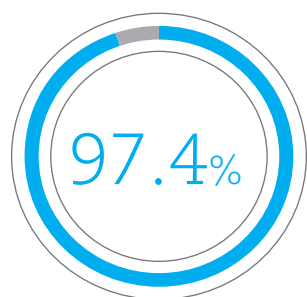
139.7 thousand

Number of employees, both those from Vale and those that were subcontracted, that were maintained by Vale at the end of 2016. [page 88](#)

Social Strengthening

3.3 million

Hours dedicated to the qualification of professionals in the Country. [page 93](#)



Percentage of employees with their performance evaluated in the year. [page 90](#)

36 traditional communities and 27 indigenous peoples....

...relate to Vale. Of the former, 35 are in Brazil and one is in Malaysia. Indigenous peoples are distributed between 12 in Brazil and 15 abroad, located in Canada, Australia, Indonesia, and New Caledonia. [page 106](#)

Appreciation of all differences

Internal and external communication campaign to reinforce the Vale's global position on diversity and to raise employee awareness on the importance of inclusion. The event addressed topics of race, gender, disability, sexual orientation, nationality and region, mobilizing the entire Vale in Brazil. [page 98](#)

1,824 vegetation...

...species and 1,443 animal species were identified in Vale's operational areas in the period, of which approximately 3.1% are on the Red List of the International Union for the Conservation of Nature (IUCN), and 1.4% are on the Brazilian Ministry for the Environment's official national list of endangered species. [page 120](#)

Sustainable waste disposal

The Vale maintains a sustainable disposal program that includes composting, reuse, re-refining, and recycling, valuing the use and seeking to reduce disposal in landfills, where 157.5 tons of residues were sent to recycling co-operatives in the state of Minas Gerais, Brazil in 2016. [page 116](#)

8.2 thousand

Number of square kilometers of natural areas protected by Vale, which represents approximately 5 times the sum of the areas of the operational units. [page 121](#)

US\$169 million

Amount invested in initiatives for the improvement of processes and the adoption of technologies and systems to control atmospheric emissions. The amount is 28% higher than the applied sum in 2015. [page 139](#)

Environmental Responsibility

Floating platforms

The management plan for ponds 7 and 10 of the Tubarão Complex included the installation of platforms for Broad-snouted caimans, ensuring the integrity of the animals in green areas – the equivalent to 38% of the venture – and increasing the safety of workers and visitors. [page 123](#)



Letter from Vale's Board of Directors

Sustainable
development
directs the business
strategy and allows
for adaptation
to changes in
economic cycles

Gueitiro Matsuo Genso
Chairman of the Board
of Directors

The year 2016 represented another year of challenges for Vale, which maintained the search for operational excellence as its priority. Despite the accounting write-offs in the fertilizer segment and Base metals operations abroad, we ended the year with net profit, influenced by higher iron ore prices, greater sales volumes, and the favorable impact of the devaluation of the Brazilian Real against the US Dollar and other currencies.

Driven by continuous investment into innovation, such as automation process, data forecast and analysis systems, and the implementation of mobile technologies, we managed to increase production while reducing associated costs. Such investments reinforce our commitment to generating value for shareholders. Just as in 2015, iron ore, nickel, and copper reached record production. These factors directly contribute to achieving the goal of strengthening the balance sheet and reducing net debt, our current priority. In addition to this, sustainable development continues to be the driver of business strategies that will enable the Vale to adapt to the constant changes of economic cycles. For this to occur, cost discipline and a focus on world-class assets are the pillars of this strategy.

Obtaining the license to operate the S11D Elieser Batista Complex in Canaã dos Carajás, Pará, was an important strategic milestone for Vale. The largest iron ore project in the history of the Vale and the mining industry will begin operating in 2017. S11D will further represent less environmental impact and increased operational efficiency, a result of the constant and increasing investments into innovation and technology.

Other relevant projects were also delivered, such as the Northern Logistics Corridor, which doubled the Carajás Railroad (in the Northern region of Brazil) and expanded the Ponta da Madeira Maritime Terminal, in Maranhão, currently the largest operating port in the world. Added to the start of the S11D operation, these initiatives will allow for the achievement of targets that are set for the market that is to increase production volume.

Vale ended 2016 with the largest cash generation of the entire industry in the iron ore business, stimulated by increased production and increased sales. Despite the decreased price of Base metals, the adjusted EBITDA represented a 72% increase compared to 2015. Total expenses decreased due to a reduction of pre-operational expenses (US\$556 million) and administrative expenses (US\$89 million), which reinforces our commitment to be an increasingly competitive company.

Our operational efficiency and rigor in investments are reasons to remain confident in achieving and maintaining positive cash flow and the consequent reduction of indebtedness, in addition to the distribution of dividends, which in 2016 reached US\$250 million, resulted of our good performance and commitment to our undertaken goals. Our commitment to communities and the environment will be maintained. In 2016, investments in the socio-environmental area amounted to US\$704 million, which represents our engagement to sustainable development. We also reaffirm our commitment to the United Nations Global Compact and to the Sustainable Development Goals.

On behalf of the Board of Directors, I thank Vale's Directors, employees, and partners for obtaining the results reported herein. I invite everyone to learn about our trajectory toward an increasingly sustainable development.

Letter from the CEO of Vale

S11D is a reference
operation for
innovation,
cost efficiency,
safety, and
environmental
responsibility

Murilo Ferreira
Chief Executive Officer

Murilo Pinto de Oliveira Ferreira will not renew his term ending in May 2017. On March 27, 2017, Vale announced the appointment of Fabio Schvartsman as its new Chief Executive Officer. A summary of Mr. Schvartsman's business experience and areas of expertise can be found at 20-F.

In 2016, we completed ten years of disclosure of the Sustainability Report, following the guidelines of the Global Reporting Initiative (GRI), an organization that establishes the international standard of corporate socio-environmental reports. In this report we reinforce our strategic principles: sustainability, competitiveness, and robustness.

We want to generate long-term value for the communities where we operate, respecting the environment and people's lives; increase our resilience with respect to economic cycles, and be flexible and capable of generating financial returns.

We know the size of our responsibility and believe that development is only sustainable when the Vale and society grow together, sharing the generated value. This means building an economic, social, and environmental legacy in the regions where we are present, mitigating the impacts of our operations in the communities where we operate, and inducing sustainable practices throughout the entire value chain. These, alongside other issues such as human rights, labor rights, anti-corruption, and environmental protection, are demonstrated in actions that are part of our commitment to the principles of the United Nations Global Compact.

We've had many stories to tell during these ten years. Vale reinvents itself every year, and people inspire and move us to become better. Speaking of innovation, one of the great chapters delivered

in 2016 was the start in the operations of the S11D Elieser Batista Complex, after 11 years of work. It is a delivery to society that clearly demonstrates that it is possible to conduct sustainable mining, at a plant in the middle of the Carajás National Forest in the Amazon, Brazil.

With S11D, Vale has opened the doors for the next generations to continue producing high quality ore, whilst still respecting people and the environment. This operation is a reference in terms of innovation, cost efficiency, safety, and socio-environmental responsibility.

It was a year of many challenges, but we ended it with a profit of approximately US\$4 billion, and US\$12.2 billion in cash generation, measured by the EBITDA. This is 70% more than what we made in 2015.

The business may be cyclical, but our values are not, and they are the pillars of our Company. Now, we need to take Active Genuine Care beyond Vale, and begin a journey toward safer mining, in favor of life throughout the industry. Life matters most at work, at home, and in our communities. We are responsible for making this a reality.

Plenty of growth and learning are portrayed here. I hope you all enjoyed reading this. [G4-1](#)

Executive Director



Murilo Ferreira
Chief Executive Officer



Humberto Freitas
Executive Director, Logistics
and Mineral Research



Luciano Siani
Chief Financial Officer and Executive
Officer for Investor Relations



Peter Poppinga
Executive Director,
Ferrous Minerals



Jennifer Maki
Executive Director,
Base Metals



Clovis Torres
Executive Director, Human
Resources, Sustainability,
Compliance and General Counsel



Roger Downey
Executive Director,
Fertilizer, Coal and Strategy

Movements

Galib Chaim | Executive Director, Capital Projects

Vania Somavilla | Executive Director, Human Resources,
Health and Safety, Sustainability and Energy

Departure
August/16

Profile – Vale

Vale S.A. is the largest mining Vale in the Americas and one of the largest in the world, leading the global market in iron ore, iron ore pellets, and nickel. It is also dedicated to the production of manganese, ferroalloys, copper, platinum group metals (PGMs), gold, silver, cobalt, metallurgical and thermal coal, potassium, phosphates, and other fertilizers. [G4-3](#) | [G4-4](#)

With this portfolio, it operates in 26 countries on five continents, relying on robust logistics systems that include railroads, maritime terminals and ports, integrated with the mining operations. It also adds maritime freight, floating transfer stations, and distribution centers, which ensures support for the distribution of iron ore in its area of operation. Through its affiliates and joint ventures, or directly, it holds relevant investments in the energy and steel industries. [G4-6](#) | [G4-8](#)

The Vale has its headquarters in Rio de Janeiro, and is organized as a privately-held publicly traded company, traded on the stock exchanges of São Paulo (BM&FBovespa), New York (NYSE), Paris (Euronext), and Madrid (Bolsa de Madrid). [G4-5](#) | [G4-7](#)

In 2016, with a workforce of 139.7 thousand, of which 109.5 thousand are located in Brazil, Vale totaled US\$24.3 billion in distributed economic value, aligned with its vocation of transforming natural resources into wealth. [G4-9](#) | [G4-10](#) | [G4-EC1](#)

Mission [G4-56](#)

To transform natural resources into prosperity and sustainable development.

Vision [G4-56](#)

To be the number one global natural resources Vale in creating long-term value, through excellence and passion for people and the planet.

Values [G4-56](#)

Life matters most;
Value our people;
Prize our planet;
Do what is right;
Improve together;
Make it happen.

Strategic pillars

Take care of our people: seek zero accidents, develop a team of professionals who are trained and accountable for their decisions, and be a great place to work.

Embed sustainability into our business: build economic, social and environmental legacies and mitigate the impacts of its operations.

Manage our portfolio with discipline and efficiency: be austere in its use of financial resources.

Focus on iron ore: reinforce Vale's leadership in iron ore by increasing the supply and quality of our products without raising costs.

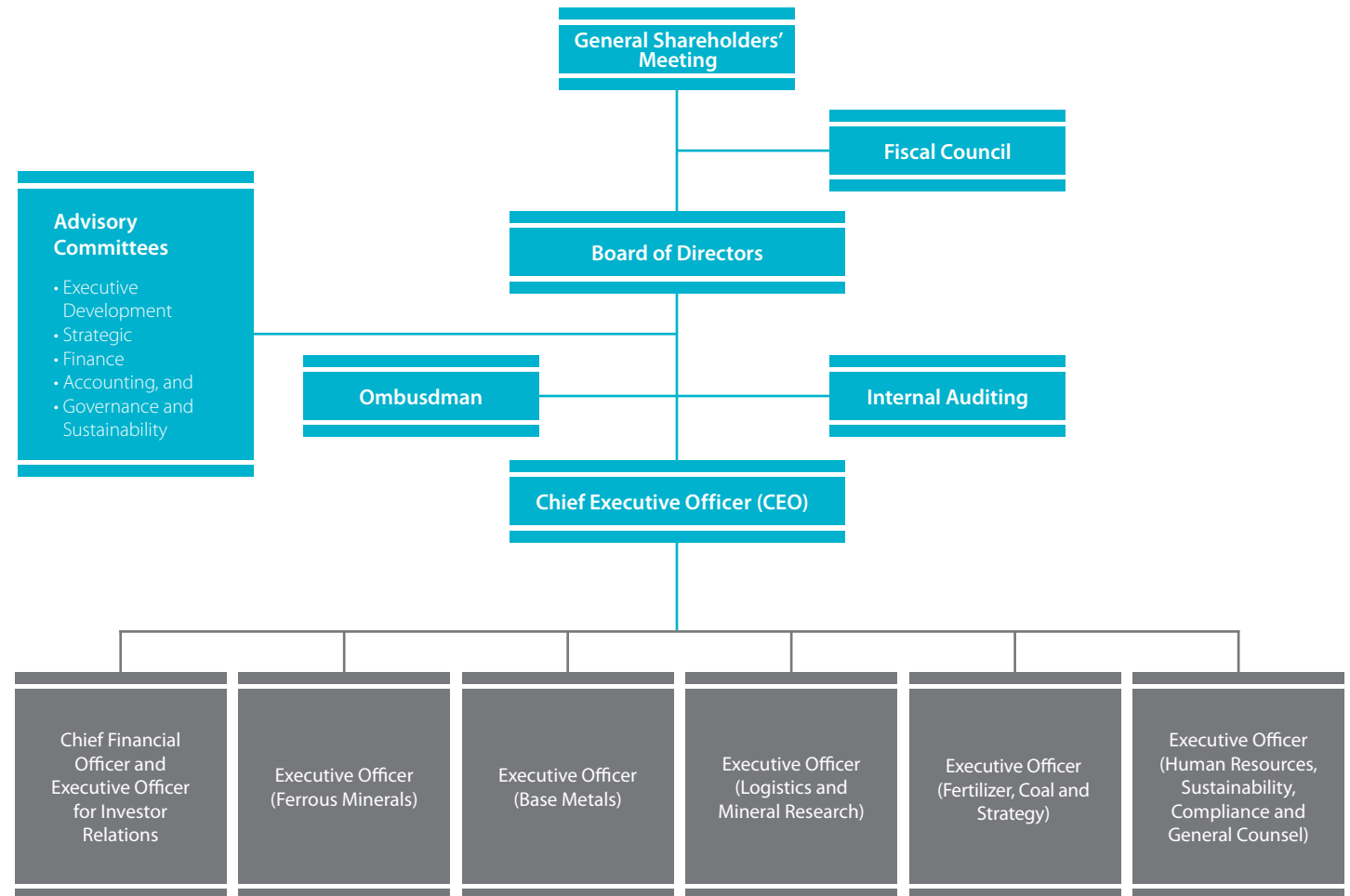
Grow through world-class assets: focus on competitive projects that have scale, are expandable and can sustain multiple economic cycles, in iron ore, nickel, fertilizers, copper and metallurgical coal.



Corporate Governance

Governance structure

Vale adopts as the guiding principles of its corporate governance model the clarity of roles, transparency, and stability. Thus, it maintains its rhythm of growth and creation of value for all its stakeholders stable. Internally, other commitments support management, such as the Sustainability Policy, Global Mitigation, and Adaptation to Climate Change policy, Human Rights Policy and Global Anti-Corruption Policy. All of these guidelines are widely disseminated and permeate the actions adopted by professionals occupying the following structure: **G4-34 | G4-35**



Detailed information on the Vale's governance structure and its performance can be obtained from the Reference Form and Form 20-F, that is found on www.vale.com.

19 CA meetings
conducted, 12 ordinary,
and 7 extraordinary

Constant, stable
growth with
transparent relations

One member and their
alternate are pointed by
the employees

Advised by Corporate
Governance and
Sustainability

CA members have extensive knowledge in finance, capital
markets, mining, and sustainability

General Shareholders' Meeting

- Annual and extraordinary meetings, when called by the Board of Directors. In 2016 there were two meetings.
- The means by which minority shareholders can express their opinion on certain subject matters presented by the Board of Directors;
- They are convened together with all the necessary material to decide on agenda matters, 30 days in advance.

Board of Directors (CA) [G4-38](#) | [G4-40](#) | [G4-42](#) | [G4-45](#) | [G4-46](#) | [G4-51](#)

- Responsible for drafting general guidelines and policies, reviewing plans and projects proposed by the Board of Executive Officers and evaluating results;
- It has the power to appoint and dismiss those responsible for internal auditing;
- Composed of 11 members and 11 substitute members, consisting of a chairman and a vice-chairman. One member and their alternate are pointed by the employees.
- None of its members hold an executive role within the Company; [G4-39](#)
- Mandate of two years and fixed-sum remuneration of members – those with recognized qualifications in the areas of finance, capital markets, corporate governance, mining and mineral sales, and sustainability;

- The Board meets on a routine basis every month, and on an extraordinary basis when called by the chairman, vice-chairman, or any other two members. In 2016, there were 19 meetings, of which 12 ordinary meetings and seven extraordinary meetings; [G4-47](#)
- Quorum that represents the majority of members;
- Board decisions are made through a simple majority vote;
- Board members are not subject to a formal self-evaluation process; [G4-44](#)
- Management of compensation of Vale's managers and employees is determined by market research from independent compensation consultants; [G4-51](#) | [G4-52](#) | [G4-53](#)
- It is advised by the Governance and Sustainability Committee, which includes in its duties the analysis and proposal of improvements in the Sustainability Report, in addition to evaluating Vale's performance in relation to sustainability and human rights aspects and proposing improvements based on a long-term strategic vision, in order to comply with the Vale's Mission, Vision, and Values; [G4-42](#)
- It is advised by the Financial Committee, whose task is, among others, to evaluate the Vale's risk management process;
- In February 2016, the Chairman of the Board of Directors, Dan Antonio Marinho Conrado, was replaced by Gueitiro Matsuo Genso. Conrado remains on the Board as a regular member.



98% of the attending

members of the Fiscal Council met
13 times in 2016

(Board of Directors members' curriculum can be viewed at www.vale.com, links About Vale/Leadership/Board of Directors, and in the Annual Report – 20-F and also in the Reference Form.)

Board of Executive Officers

- It has the task of implementing the business strategy determined by the Board of Directors, developing plans and projects and also responsible for the Vale's operational and financial performance;
 - It is comprised of a Chief Executive Officer (CEO) and six Executive Officers, responsible for: (i) Logistics and Mineral Research; (ii) Financial Office and Investor Relations; (iii) Ferrous Minerals; (iv) Fertilizer, Coal and Strategy; (v) Base Metals and; (vi) Human Resources, Sustainability, Compliance and General Counsel;
- G4-36**
- Executive Officers are appointed by the Board of Directors;
 - Executive Officers and other Vale executives receive bonuses and incentive payments insofar as they meet individual and collective goals to achieve the Vale's strategic results, related to financial, operational/technical and sustainability indicators.

(Board of Executive Officers members' curricula can be viewed at www.vale.com, links About Vale/Leadership. More information is available in the Reference Form, on the same website address, and in the Annual Report – 20-F.)

Fiscal Council

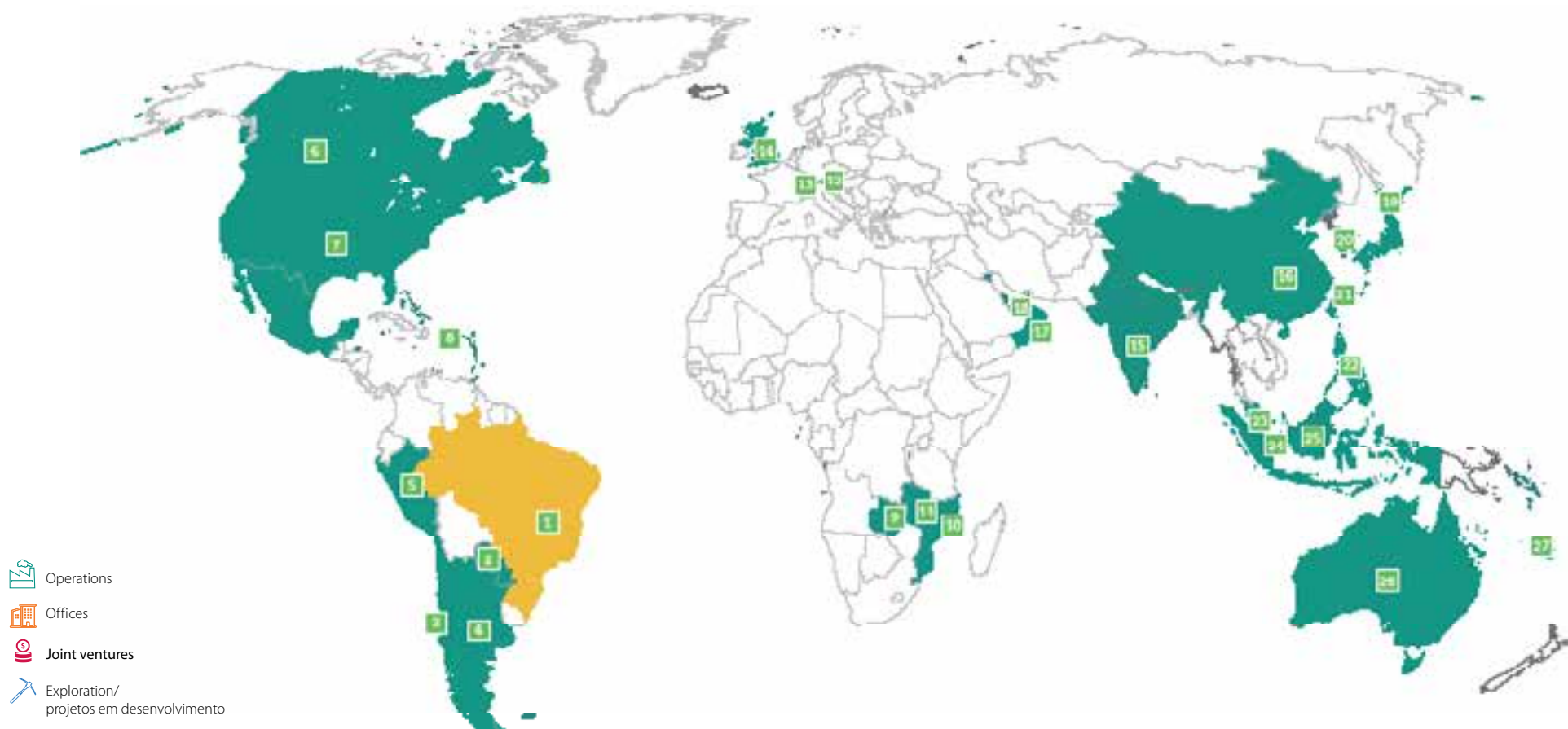
- This body has the task of overseeing the Vale's management activities and reviewing the financial statements;
- It is a permanent council and also performs the role of Audit Committee as required by applicable US law¹;
- It is made up of five members and four substitute members, none of which form part of the Board of Directors or the Board of Executive Officers.
- In 2016, the members of the Board met 13 times, with 98% attendance.

Advisory Committees **G4-37 | G4-43 |**


















G4-48 | G4-49

- Provide support for the Board of Directors in conducting its business.
- There are five committees: Executive Development; Strategic; Finance; Accounting; and Governance and Sustainability.





¹. Exchange Act Rule 10A-3.



Americas

- 1 **Brazil (Vale's worldwide headquarters)**    
- 2 Paraguay 
- 3 Chile 
- 4 Argentina  
- 5 Peru  
- 6 Canada   
- 7 United States   
- 8 Barbados 




























Africa

- 9 Zambia 
- 10 Mozambique  
- 11 Malawi 

Europe

- 12 Switzerland 
- 13 Austria 
- 14 United Kingdom  

Asia and Oceania

- 15 India 
- 16 China   
- 17 Oman  
- 18 United Arab Emirates 
- 19 Japan  
- 20 South Korea   
- 21 Taiwan  
- 22 Philippines  
- 23 Malaysia  
- 24 Singapore 
- 25 Indonesia   
- 26 Australia   
- 27 New Caledonia  

Recognition

GHG Protocol – The Gold Seal was awarded by the Brazilian GHG Protocol program to Vale's Greenhouse Gas (GHG) Emission Inventory. The Vale has been part of the program since 2009.

CDP Climate Change Program – The Vale was once again recognized by the organization as a leader on the issue "climate change", having scored an A.

Confeb 2016 – The award, one of the main acknowledgments in the tax area, was achieved in the "project of the year" category, because of the Vale's Information Technology and tax teams' automation of the verification of CFEM and TFRM values, which eventually replaced a task that was previously conducted manually, on spreadsheets.

2016 Latin America Executive Team – In the ranking, prepared by the American Institutional Investor magazine, Vale stands out in 15 categories of the Metals & Mining segment. Its CEO, Murilo Ferreira, won first place in the Best CEO category. He was awarded by buy-side analysts, who recommended investments for their own portfolios, by sell-side analysts, who recommended investments for third parties

in the overall category. The same recognition was awarded to the Chief Financial Officer and Executive Officer for Investor Relations (IR), Luciano Siani Pires, winner of the Best CFO category, in buy-side, sell-side, and overall votes. The Vale was also awarded in the following categories: best IR professional for the Investor Relations and Controller Director, Rogério Nogueira, best IR team, best IR program, and best website. In the score it received the title of most honorable Vale in the mining industry.

International Finance Corporation (IFC) – The organization recognized and approved excellence in the socio-environmental aspects of the Nacala Corridor project, understanding that it will have exceptionally positive impacts on the region, as the use of the railroad will be shared between: ore transportation, general cargo, and passengers.

Best Practices in Health and Safety – The award, promoted by the Brazilian Mining Institute (Ibram), acknowledges efforts in adopting advances in the work environment. Vale excelled in the Management of Tailings Dam Emergencies. The Vale also ranked first places in work at height in civil construction for the maintenance of the slope of the Águas Claras Mine pit, and for the management of absenteeism based on the main reasons for absenteeism, focusing on the comprehensive health of employees of the Ferrosos Sul Operation. It also ranked second place for the corporate health approach on absenteeism management at Vale, and third place for the recognition program generating reduced absenteeism in contracted companies.

Among the year's recognitions, Vale stood out in the Latin America Executive Team ranking of the Institutional Investor magazine, in 15 categories of its segment



Business Vision



See below the commitments of the recently-revised Sustainability Policy, as well as the corresponding Sustainable Development Goals (SDGs), which are covered in the issues addressed in this pillar. This policy guides the general principles of Vale's and at this report are illustrated some examples related to the respective themes. View the Policy in its entirety at www.vale.com.

Relation to the Sustainability Policy

Vale will work contributing to the discussion and confrontation of the challenges in terms of sustainable development that are shared across various regions and countries where we are present. Our main commitments are:

- To promote complete transparency in terms of governance, policy, procedures, practices and the Vale's performance to our global stakeholders;
- To pursue opportunities that contribute to global targets' achievements related to our business, by seeking partnerships, solutions and technology for challenges to sustainable development;
- To work harmoniously with our stakeholders in order to contribute to the construction of a positive legacy for future generations, balancing the social, environmental and economic aspects of our business, and
- To monitor and anticipate trends in global themes of sustainability by developing, adopting, sharing and promoting insights of best practices, so as to continuously improve our performance.

Relation to SDGs



S11D Complex – Competitiveness with safety

Inaugurated in December 2016, the mission of the S11D complex is to increase Vale's competitiveness and contribute to establishing Brazil as one of the world's largest iron ore producers. Its business challenge in facing the global mining market is to provide low cost, high quality, cutting-edge technology, and flexibility to meet the tailored needs of its clients.

The venture has ground-breaking equipment and solutions, which are essential to increasing the Vale's total iron ore production in Pará to 230 million metric tons per year in 2020 – approximately 55% higher than the volume in 2016 – conferring an advantageous position in the next cycle of strong demand for iron ore.

Another gain, resulting from the process of continuous mining, is the greater flexibility of the operation, which is able to adapt to the clients' demands. The high iron ore content will contribute to the production of the iron ore at the aimed specifications. In addition, the project will contribute to reducing the operating costs of the North System – from extraction at the mine to deliver at the port, in Maranhão.

Among the smart solutions adopted is the truckless system, reduces the use of diesel by 70% and emissions to environment. A structure comprising excavators and crushers will replace the 100 vehicles that would be needed to extract iron ore, which will feed approximately 30 kilometers of conveyer belts and, in addition to reducing the amount of residues, it aims to reduce approximately 70% of diesel consumption. The replacement of off-road trucks with the truckless system seeks a safer operation aiming to reduce the number of employees involved directly in the operation.

**5%**

the expansion of the
price of iron ore as a
comparison between
2015 and 2016

US\$83.95

maximum price per metric ton of the iron ore
registered in 2016, in December

Ethics, integrity, and transparency in relations

Global economic scenario

On the international context, 2016 was marked by political and economic changes in the way that both events raise uncertainties regarding the world trade. However, for the commodity market, the change of government in the United States can have a positive impact, given the expectation of fiscal stimuli for investments in infrastructure.

In China, the economic growth of 6.7% in 2016 was stimulated by public policy and credit facilitation, which benefitted the resumption of real estate investments with increased sales and declining inventories. Despite the slowdown, Chinese economic growth still remains high, and accompanies China's gradual transition to a more consumer-oriented economy that is developing its service industry, and is less dependent

on infrastructure and real estate developments. This transition is positive for the global economy, as it puts China on the path to sustainable growth.

Challenges and uncertainties resulting from this scenario implied strong volatility in the price of iron ore, which registered a minimum value of US\$39.25/metric ton in January and a maximum of US\$83.95/metric ton in December – in the annual comparison to 2015, iron ore accounted for an increase of 5%. Given the slowdown in world growth and oversupply of various commodities, the companies in the industry continue to make structural changes in search of productivity gains, cost management, and value creation for investors.



90 million

metric tons/year of iron ore is the production capacity of the S11D Eliezer Batista Complex, Vale's largest operation

Vale maintains its asset-development strategy and world-class projects characterized by abundant, long-lasting reserves, and high-quality ore at low production costs. In 2016, Salobo mine achieved nominal capacity for copper production and began producing iron ore at the S11D Eliezer Batista Complex, the Vale's largest operation, with a production capacity of 90 million metric tons/year of iron ore.

Vale seek to work in the reduction of costs and expenses, with respect on the safety of employees, transparency in relationships with stakeholders and guided by sustainable practices along the value chain. Thus it remains firm in its pursuit of a significantly lower net debt, while it completes its investment cycle. This way, the Company, aims to set a path for stronger cash generation from 2017 onwards and to seek to increase shareholder returns.

Ethics and transparency

Vale maintains a Code of Ethics and Conduct with the standards of behavior expected of its employees, in addition to internal controls whose effectiveness is evaluated by Management and attested to by independent auditors, in accordance with the provisions of the Sarbanes-Oxley Act (SOX). The Ombudsman's Office reinforces this structure – directly linked to the Chairman of the Board of Directors – who is responsible for providing information to the Fiscal Council and to the Governance and Sustainability Committee. The channel is also tasked with the improvement of ethical awareness, acting as a proactive, transparent, independent, and impartial tool in handling claims. [G4-41](#)

Ombudsman

works proactively,
transparently,
independently, and
impartially

40 thousand

employees are
involved worldwide
in ethical conduct
dissemination
training

Integrity became
part of Vale's
annual calendar in
order to reflect on
the issue

Further aligned with our commitment to compliance, the Vale supports the Extractive Industry Transparency Initiative (EITI)¹, a voluntary initiative that promotes transparency in financial flows between extractive organizations and the governments of countries in which they operate. Under the EITI, Vale participates in coordination committees in Mozambique, Peru, and Indonesia.

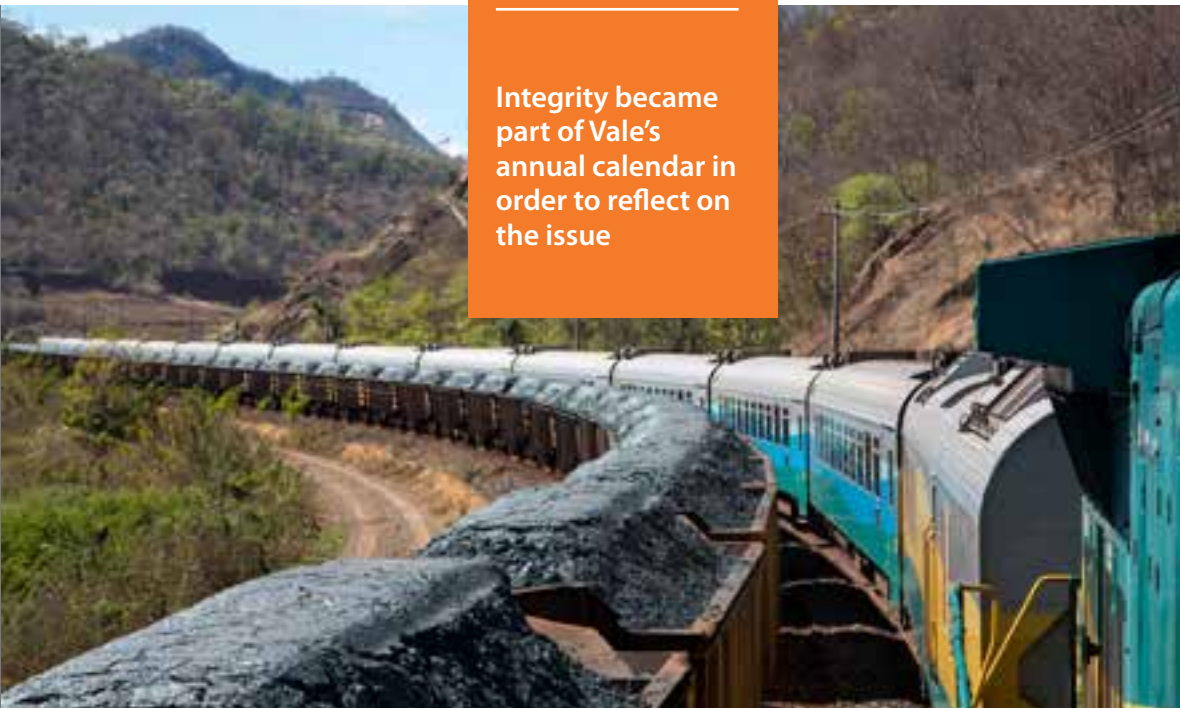
It is also a signatory of the Business Pact for Integrity and Against Corruption, created by the Ethos Institute, by the Office of the Comptroller General (CGU), and by the United Nations Office on Drugs and Crime (Unodoc), and has compliance, anti-bribery, and anti-

corruption standards, rules, and procedures². In this sense, it maintains and disseminates the Global Anti-corruption Program, comprising the Global Policy and the Global Anti-corruption Manual, with rules for actions in situations that can incur risk of corruption, such as offering and receiving presents and hospitality; non mandatory expense as political and philanthropic donations, investments in communities, sponsorships, relationship actions; contracting of third parties; mergers, acquisitions, and joint ventures; and selection and compensation of employees and managers, among others. There is a Corporate Integrity team dedicated to conducting and monitoring the program, with dedicated professionals in Brazil, Canada, Mozambique, Indonesia, and Singapore, from where they monitor all of Vale's operations and activities, globally. [G4-S03](#)

In addition, in 2016, the Movement for integrity – which had its first edition in 2015 to disseminate the importance of the value “Acting correctly” – became part of the Vale's annual calendar with an event about reflecting on ethics and integrity. Also in the year, as in 2015, the focus was directed toward specific and detailed face-to-face training on the Global Anti-corruption Program for professionals from areas considered priority, in order to mitigate the risk of corruption – among them, those responsible for relations with government employees, hiring third parties and intermediaries, donations, sponsorships, investments in communities, and relationship actions, development of new businesses, and acquisition of companies.

¹. Vale is also part of the EITI Coordination Committee in Mozambique, Indonesia and Peru (sub-national level).

². New structural evaluations will be carried out periodically or whenever the need for adjustments in the practices of a given business area or company of the group is detected.



There was also online training on the Ethics and Integrity Development Trail, with extensive modules on the Code of Ethics and Conduct, Global Anti-corruption Program, and Information Security. The initiative involved more than 40,000 employees worldwide. In addition, there was the internal disclosure of the rules established in the Policy and in the Anti-corruption Manual, and improvements to controls, which must be respected by all business units and controlled companies. [G4-56](#) | [G4-57](#) | [G4-58](#)

Ethical awareness

A series of actions resulted from Vale's Ombudsman's Office, such as the creation of the Ethics Committee and periodic reports to the Board of Directors, officers and employees, giving more transparency to the process³; a survey on Ethics and the Ombudsman's Office, in Brazil, Canada, and Mozambique; the Movement for Integrity; online training on the Code of Ethics and Conduct and the inclusion of the video on onboarding new employees and on the mobilization of service providers; and the release of Ethics on the Agenda, a photonovel that periodically discloses an ethical aspect to be discussed among employees. [G4-SO4](#)

The improvement of the claims handling process allowed for a significant reduction of the response time for claimants. For confirmed cases of wrong-doing, exposure and risk analyses are conducted and a corrective action plan is prepared, which included mitigation measures. The categorization of received claims enables, for example, the identification of cases of discrimination.

The Ombudsman may also receive complaints referring to the infringement of any rules or conduct guidelines described in the Code of Ethics and Conduct, such as harassment, discrimination, improper use of resources, inappropriate behaviour, fraud, bribery, corruption, conflict-of-interest, infringement of environmental legislation or health and safety procedures, among others. This channel can also be used to deal, in the second instance, with questions that have not been resolved by other means.

Contacts with the area can be made electronically via, letter, e-mail, and telephone, and even through a meeting with the ombudsman. A contracted company, ensuring the confidentiality of the process and anonymity of the whistleblower, operates the channels.

During 2016, there were no recorded cases of corruption by employees or third parties involving government employees or government officials. Regarding discrimination in the workplace, the Ombudsman's Office examined 16 cases, of which three were confirmed to have resulted in dismissals and disciplinary measures. With the support of Human Resources, the Ombudsman's Office reviews and handles cases of discrimination through interviews with the parties involved, peers, and managers. [G4-50](#) | [G4-EN34](#) | [G4-LA16](#) | [G4-HR3](#) | [G4-HR12](#) | [G4-SO11](#) | [G4-SO5](#)

3. Contact Us, HR, and Hello Railroad, for example.



Actions 2016

Among the ethics-related initiatives undertaken during the year, the following stand out: the maintenance of Ethics on the Agenda and the establishment of Ethics Correspondents, directed towards overseas operations, which operate similar to the members of the Ombudsman Network – in force since 2015 in Brazil. These are professionals located in various locations where Vale has operations abroad, and whose mission is to be the focal point of ethics at the location, facilitating communication with the Ombudsman's Office and subsidizing improvements for internal processes.

Relationship with the Government

Due to the scale of its operations and investments, Vale maintains continuous dialogue with government agencies, directly or through sectoral organizations. With the aim of participating proactively in the formulation of public policies, and the incorporation of differing points of view, Vale seeks to establish and maintain an environment favorable to the development of the mining industry. In addition, the Vale tries to encourage and establish partnerships with governmental institutions, companies, and civil society organizations, in order to enhance socio-economic development in regions where its operations are located.

Regarding political and partisan aspects, Vale remains impartial and strictly complies with the legislation of the countries where it operates. Its employees are free to participate in these activities, as long as their actions and opinions do not contradict the Vale's Code of Ethics. Vale does not make donations to electoral campaigns – a practice forbidden to legal entities since the publication of Brazilian Law No. 13,165, dated September 29, 2015. [G4-S06](#)

The year 2016 was marked by the record production of iron ore, nickel, copper, cobalt, gold, and coal

State Goods and Services Tax (ICMS)

A series of bills are going through the Brazilian National Congress which seek to amend Supplementary Law No. 87/96 (Kandir Law), which establishes the general standards for Tax on the Circulation of Merchandise and the Providing of Services (ICMS in portuguese), with a view to revoking its non-levy on the export of primary products.

Among the provisions is PL No. 11/2011 and PEC 92/2011 and PEC 8/2015, which institute the incidence of ICMS on export operations of primary and semi-finished products. After claims from entities representing the primary and semi-finished products export sector, the proceedings on these matters was ended in 2016, with the following status:

- PL No. 11/2011 – The opinion for rejection was approved in by the Economic Development, Industry, and Commerce Commission;
- PEC 92/2011 – Awaiting the election of members to the Special Committee;
- PEC 8/2015 – Pending the opinion of the Legislator on the Constitution, Justice, and Citizenship Commission;
- Vale acted on the subject through the National Confederation of Industry (CNI) and the Brazilian Mining Institute (Ibram), whose actions will continue throughout 2017.

Results and Distribution of Added Value

The year of 2016 was marked by strong economic and financial performance, with solid operating performance and annual production records for iron ore, nickel, copper, cobalt, gold, and coal. Iron ore production amounted to 348.8 Mt⁴, with a record 148.1 Mt in Carajás. Regarding base metals, 311,000 metric tons and 453,000 metric tons of nickel and copper were achieved, respectively. The base

⁴. Including purchases and minus the production attributable to Samarco.

metals performance was the result of record annual nickel production at Vale Nouvelle-Calédonie S.A.S. (VNC) and record annual copper production at Salobo. The production of gold as a by-product of copper and nickel concentrate was 483,000 oz., and cobalt, 5.8 thousand metric tons, which also set annual records.

In parallel to this, costs and expenses were again reduced, by US\$1.841 billion⁵, a result of efforts to increase the competitiveness of the mining industry, as well as efficiency and austerity measures. Sales, general and administrative expenses (SG&A), without depreciation, were reduced by 13.7% (US\$89 million) compared to 2015, totalling US\$439 million⁶ in 2016.

In 2016, investments totaled US\$5.5 billion, US\$2.9 billion less than the amount registered in 2015. The projects for the expansion of coal mines in Moatize, Mozambique, and S11D were delivered. S11D Project is the largest mining complex in Vale's history, was delivered, with a production capacity of 90 million metric tons of iron ore per year, with 66.7% iron content. The venture adds cutting-edge technology, low cost, and high productivity, in addition to expressing the Vale's ability to perform.

Net income totaled US\$4.0 billion, and operating cash generation, as measured by adjusted EBITDA, reached US\$12.2 billion, 72% above the US\$7.1 billion in 2015, mainly due to better EBITDA results for Ferrous Minerals (2016

totalled US\$10.5 billions, US\$4.6 billion above compared to 2015), Base Metals (2016 totaled US\$1.8 billion US\$460 million above compared to 2015), and Coal (2016 totaled US\$54 million negative, US\$454 million more than 2015).

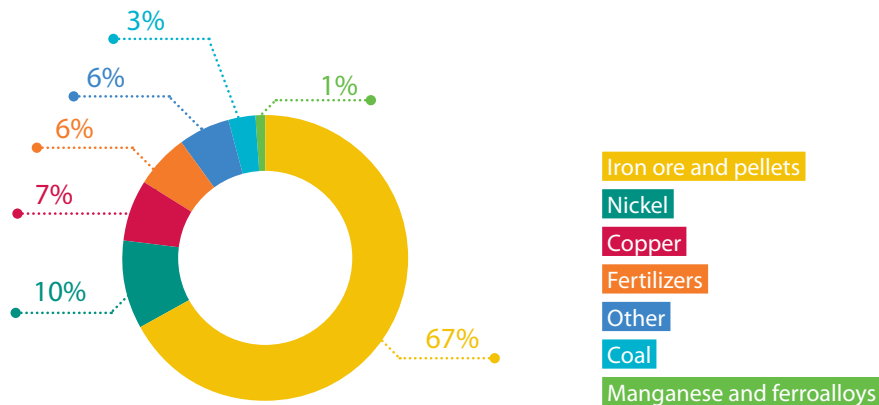
The solid results of 2016 allowed for the distribution of remuneration to shareholders, and the preservation of a healthy capital structure, in two installments: the first in the amount of US\$250 million, paid in December 2016, and the second totaling R\$4.7 billion, to be paid on April 28, 2017.

5. Does not include depreciation and amortization and net of the non-recurring effects of US\$230 million from the goldstream transaction in 1Q15 and US\$150 million from the goldstream transaction in 3Q16, recorded in 1Q15, and US\$331 million in 4Q15 and US\$37 million in 4Q16 from adjustment in ARO (Asset Retirement Obligation).

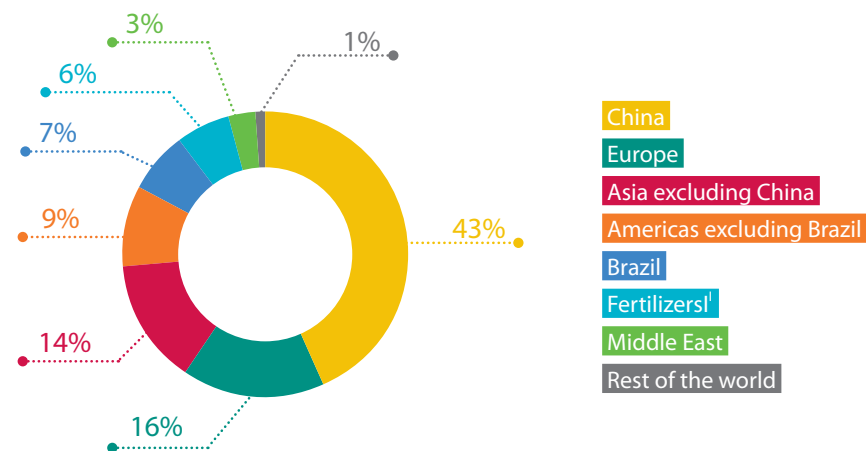
6. Does not include depreciation and amortization.

Generated and Distributed Value (US\$ million)	North America, except Canada	Canada	South America, except Brazil	Brazil	Europe	Africa	Australasia	Middle East	TOTAL
Revenue	75.0	5,195.0	17.0	10,557.0	7,201.0	913.0	3,215.0	315.0	27,488.0
Direct Economic Value Generated	75.0	5,195.0	17.0	10,557.0	7,201.0	913.0	3,215.0	315.0	27,488.0
Operational costs	82.0	4,523.0	32.0	8,706.0	2,861.0	746.0	464.0	226.0	17,640.0
Employees' salaries and benefits		365.0	8.0	1,288.0	3.0	173.0	520.0	43.0	2,400.0
Research and development		68.0	10.0	195.0	15.0	13.0	18.0		319.0
Payments to capital providers	96.0	2.0		3,291.0	15.0		5.0	2.0	3,411.0
Payments to the government	(57.0)	(134.0)	18.0	487.0	35.0	(29.0)	89.0		409.0
Resources invested in communities	0.1	6.5	0.6	125.2		0.6	8.8	0.2	142.0
Economic Value Distributed	121.1	4,830.5	68.6	14,092.2	2,929.0	903.6	1,104.8	271.2	24,321.1
Economic Value Retained	46.1	364.5	(51.64)	(3,335.20)	4,272.0	9.4	2,110.2	43.8	3,166.9

Net revenue by product 2016 (U\$29.4 billion)



Net revenue by destination 2016 (U\$29.4 billion)



I. Fertilizer data was separated, following Vale's standards on financial reporting, considering the expectation of selling fertilizer assets in the short term.

Summary of production

In thousand metric tons	2015	2016
Iron ores ^I	345,879	348,847
Pellets ^I	58,510	46,220
Manganese ores	2,441	2,371
Coal	7,344	7,216
Nickel	291	311
Copper ^{II}	424	453
Cobalt	4,531	5,799
Gold (thousands of ounces)	420	483
Potassium	481	501
Phosphate rock	8,163	7,546
Ferroligas	99	124
Platinum (thousands of ounces)	154	166
Palladium (thousands of ounces)	341	322

I. Excluding the production attributed to Samarco.

II. Including the production attributed to Lubambe.

As a result of increased efficiency, costs and expenses were reduced by US\$1.841 billion

Investments

Investments in growth and maintenance totaled US\$5.5 billion, a reduction of US\$2.9 billion compared to 2015, principally as a result of the disciplined allocation of capital, the delivery of projects, optimizing scope, and efficiency in the implementation of projects and currency exchange.

Most of the funds invested in ferrous metals referred to growth initiatives in the iron ore business, specifically the S11D project and its infrastructure. The Moatize II project also received investment, as did its associated logistics project, the Nacala Corridor.

A further US\$704 million in corporate social responsibility was allocated, of which US\$562 million is for environmental protection and conservation, and US\$142 million for social projects aimed at improving quality of life and creating opportunities for economic and social mobility in communities located near the operations. These investments attest to Vale's commitment to health, safety, and socio-environmental responsibility.

For 2017, the capital investment plan was optimized and reduced to US\$4.5 billion, through the maintaining of discipline in the allocation of capital and with only one major capital project, S11D.

Investments by type (US\$ billion)	2012	2013	2014	2015	2016	2017 ^I
Execution of projects	11.6	9.6	7.9	5.5	3.2	1.8
Maintenance of operations	4.6	4.6	4.1	2.9	2.3	2.5
ROM replacement ^{II}	-	-	-	-	-	0.2
Total	16.2	14.2	12.0	8.4	5.5	4.5

I. Investment budget.

II. Investments to maintain the productivity of current operations.

Long Harbour – Full production without emissions

With operations initiated in 2014, the Long Harbour Processing Plant (LLHP)⁷ in Canada is expected to achieve its maximum production capacity of 50,000 metric tons of refined nickel per year by the end of 2018.

The hydrometallurgical technology adopted at LHPP processes nickel-bearing concentrates from the Voisey's Bay mine I without generating emissions that are common to traditional smelting and refining technologies. The process extracts metals from concentrate in a chemical process that combines water, oxygen, and other substances in a pressurized vessel.

7. Vale Newfoundland & Labrador Ltd.

Sustainability KPI ⁸

In addition to the economic and financial performance and operational excellence, the sustainability indicators are part of the Vale's variable compensation program.

The Sustainability KPI scorecard is composed by indicators related to aspects such as water, energy, emissions, waste and recovery of degraded areas, as well as the social issues of the operational units. These indicators are rigorously weighted alongside the operations in order to ensure the continuous improvement of sustainability performance.

Operations that had their goals partially achieved or did not reach them, justified in the majority by diverse restrictive operational conditions, will seek to pursue the goals agreed for the next year.

Performance results are shown in the following table:

⁸. Key Performance Indicators.

Business area	Indicators	2016 results	2016 results (average variation compared to 2015)
Iron ore and pellets	Recovery of Degraded Areas (RAD)	●	Annual Recovery of Degraded Areas (RAD) Plan
	Water Resources	●	25% average reduction in five sites
	Generation of Dangerous Waste	●	2% reduction in one site
	Atmospheric Emissions	●	12% average reduction in three sites
	Energy Consumption (Fuel and Electricity)	●	5% average reduction in four sites
Base metal	Significant Social Initiatives	●	Annual Action Plan
	Waste Management	●	47% average increase in three sites
	Water Resources	●	38% average reduction in two sites
	Environmental Incidents	●	59% reduction in one site
	Atmospheric Emissions	●	48% average reduction in two sites
Coal	Energy Consumption (Fuel and Electricity)	●	6% average reduction in five sites
	Significant Social Initiatives	●	Annual Action Plan
	GHG Emissions	●	27% reduction in one site
	Waste Management	●	22% reduction in one site ^I
	Energy Consumption (Fuel and Electricity)	●	20% average increase in two sites
Fertilizers	Significant Social Initiatives	●	Annual Action Plan
	Generation of Dangerous Waste	●	22% average reduction in three sites
	Generation of Waste	●	14% average reduction in two sites
	Waste Disposal	●	163% increase in one site ^I
	Water Resources	●	Maintenance of the average result in 3 sites
Logistics	Energy Consumption (Fuel and Electricity)	●	8% average increase in three sites
	Significant Social Initiatives	●	Annual Action Plan
	Water Resources	●	23% average reduction in six sites
	Atmospheric Emissions	●	44% reduction in one site
	Generation of Dangerous Waste	●	7% reduction in one site
Procurement	Energy Consumption (Fuel and Electricity)	●	4% average reduction in five sites
	Waste Disposal	●	6% increase in one site

I. The indicator orientation is that the higher the result, the better the performance is.

Key

- Challenge reached (= 125)
- Target reached (>100)
- Target partially reached (>50)
- Target not reached (<50)



Legal and regulatory management and global positioning

Legal compliance⁹

In 2016, although it was not the subject of new and relevant civil, regulatory, or tax lawsuits, Vale was cited in 87 court cases, of which 78 are labor¹⁰. **G4-S08**

In addition to the occurrences related to the Fundão Dam accident, another nine environmental relevant cases⁹ were registered. On the other hand, six relevant lawsuits of the same nature were settled¹¹. The Vale further received three sanctions of a non-financial nature. Among the lawsuits, the following stand out:

- In June, the Environmental Department of the State of Minas Gerais ordered the suspension of part of the activities of the Jangada and Feijão mines due to alleged impacts on pits located in the area. Vale was granted an injunction against the measure, authorizing activities at the mines.
- In January, as a result of an investigative procedure by the Federal Police, the Federal Justice of the State of Espírito Santo ordered outrightly the suspension of activities of the Tubarão Port on grounds of alleged environmental damage supposedly due to the spillage of material into the sea at Camburi (Vitória, ES) and the emission of particulates (coal and iron ore) into the atmosphere at Vitória. The Regional Federal Court (TRF in portuguese) of the second region accepted the Writ of Mandamus filed by Vale and established a deadline for the implementation of specific measures, that the Vale understands as having been met within the specified period. In July, the TRF confirmed the suspension of the effects of the injunction and ordered an investigation to confirm the effectiveness of all the containment measures adopted by Vale.

⁹. In this report, only lawsuits initiated or settled in 2016, that meet the applicable methodology relevance criteria, will be reported. Lawsuits prior to 2016 will not be reported. In any case, Vale's Report 20-F contains a report of all lawsuits that meet the criterion of a financial relevance of 1% of the Vale's shareholders' equity, currently in progress.

¹⁰. Lawsuits with an amount involved from R\$3.5 million or US\$1 million (according to Sarbox criteria).

¹¹. The lawsuits were terminated by extinction, agreement, or payment of a fine.

- In May, the operation of a tailings dam by Vale Fertilizantes S.A. (Vale Fertilizantes) in Araxá (MG) was suspended due to a alleged formal irregularity in its licensing process, related to the crest quota. The Vale regularized the situation with the environmental agency and with the Federal Prosecutor's Office eight days after the operation, proving that there was no damage to the environment and that the dam operated within the necessary conditions of safety and stability.
- In May 2016, Vale became aware of the filing of a Public Civil Action, by the Bayaprá Indigenous Association for the Defense of Xikrin People from O-Odja Community and the Porekro Indigenous Association for the Defense of Xikrin People from Catetê Community, related to the Study of the Indigenous Component of S11D Environmental Licensing Project before the Court of the 2nd Federal Court in Marabá (PA). In addition to Vale S.A., the action refers to the National Indian Foundation (Funai), the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) and the National Bank for Economic and Social Development (BNDES).

The authors requested the suspension of the environmental licensing of the S11D project until consultation with the indigenous communities and the payment of R\$573,000 per month per community until the end of the studies. The amount refers to material damages to be ascertained by reason of not carrying out the studies. They also require, for moral damages, the value of US\$286.5 million. In addition, the amount of US\$20.7 billion was indicated as value of the case.

Vale clarifies that the value of the cause has no relation to the requests, and is only indicated by the authors of the process as the "investment profile in the S11D project". It is also important to inform that the site more than 10km away from indigenous land and, therefore, outside the influence area according to legislation. After Vale had demonstrated compliance with the legislation and the requirements of the environmental agencies at the time of the studies and the judicial inspection made in the area, the authors' request was denied. [G4-HR8](#)

- Vale Fertilizantes received a notice of infraction for a similar situation at the tailings dam in Tapira (MG). In this case, however, activities were not suspended because a fine was imposed by the environmental agency. The Vale signed a Statement of Commitment with the environmental agency and the Public Prosecutor's Office and presented its defense, ensuring the continuity and regularity of its operations.
- In January 2017, a fire broke out at the Ammonium Nitrate bulk warehouse of the Cubatão (SP) unit of Vale Fertilizantes. The fire was controlled in less than five hours by the Fire Department and the Vale's fire brigade team, without any record of casualties or environmental damage. Specific procedures were instituted by the relevant environmental agency and by the Federal Prosecutor's Office to determine the causes of the accident. In January 2017, the São Paulo State Environmental Protection Agency (CETESB) issued an infraction notice with a fine to the amount of R\$8 million. A defense was presented against the notice. [G4-EN29](#)



Civil

In 2016, no judicial or administrative proceedings relevant to this report were initiated.

Regulatory

No judicial or administrative proceedings relevant to this report were also initiated in the year.

Labor

In 2016, 78 lawsuits were filed that meet the financial relevance requirement of this report, with a value of above US\$1 million. Among them, the following stand out:

- The continuation, in Brazil, of the judicial discussions on the collection of the Government Severance Indemnity Fund for employees (FGTS) intended by the Federal Government, on certain portions of the payroll for the period from 1999 to 2003.
- The continuation of discussions on: (i) fatal accidents occurred during the exercise of work activities; (ii) working conditions (rest

periods/temperatures) in the Taquari Vassouras potassium mine, in Sergipe; (iii) outsourcing of fire plan activities, detonation, loader and drill operations, and tailings dam monitoring activities in the mines of the State of Minas Gerais; (iv) hours in itinere¹² in Carajás (in this case, an agreement that is in the compliance phase was entered into).

- At Vale Fertilizantes, nine labor lawsuits were filed, which deal with overtime, work hours, including cases of temporary stability damage, material and aesthetic damage.

Tax

The most significant tax discussions¹³ refer to lawsuits which discuss (i) the deductibility of social contribution payments on net income (CSLL) from the calculation basis of corporate income tax (IRPJ), (ii) disallowances of Social Integration Program (PIS in portuguese) and Contribution to Social Security Financing (Cofins in portuguese) credits, (iii) CFEM fines (royalties) and (iv) charges related to taxes on the circulation of goods and services (ICMS).

In relation to these theses, in 2016, Vale received new charges of CFEM (approximately US\$1 billion), and PIS and Cofins (approximately US\$1 billion).

A criminal investigation was initiated against members of the MBR administration alleging fraud related to the collection of ICMS. The amount involved in the collection is approximately R\$7 million. If the allegation of fraud is accepted by the judge, criminal proceedings against the administrators will be initiated.

¹² The time spent by the employee on the trip between home and work made available by the employer.

¹³ 1% of Vale's shareholders' equity, with a value of R\$1 billion or US\$286.5 million, as published in Report 20-F, or whose subject is of considerable relevance or had significant repercussion.

Unfair competition

In 2016, no judicial or administrative proceedings relevant for this report were initiated. [G4-S07](#)

Regulatory changes

The mining activity is carried out by governmental concession – which is why it is subject to specific regulations. However, Bill No. 5,807/2013, which proposes amendments to Decree-Law No. 227 of February 28, 1967 (current mineral legislation), remains under discussion in the scope of the Federal Executive and Legislative branches.

Submitted by the Federal Government, the provision, which is still before the Chamber of Deputies, covers mining activities, establishing a National Council for Mining Policy and the National Mining Agency (ANM in Portuguese), including other measures (more information on regulatory issues can be found in the Report 20-F).

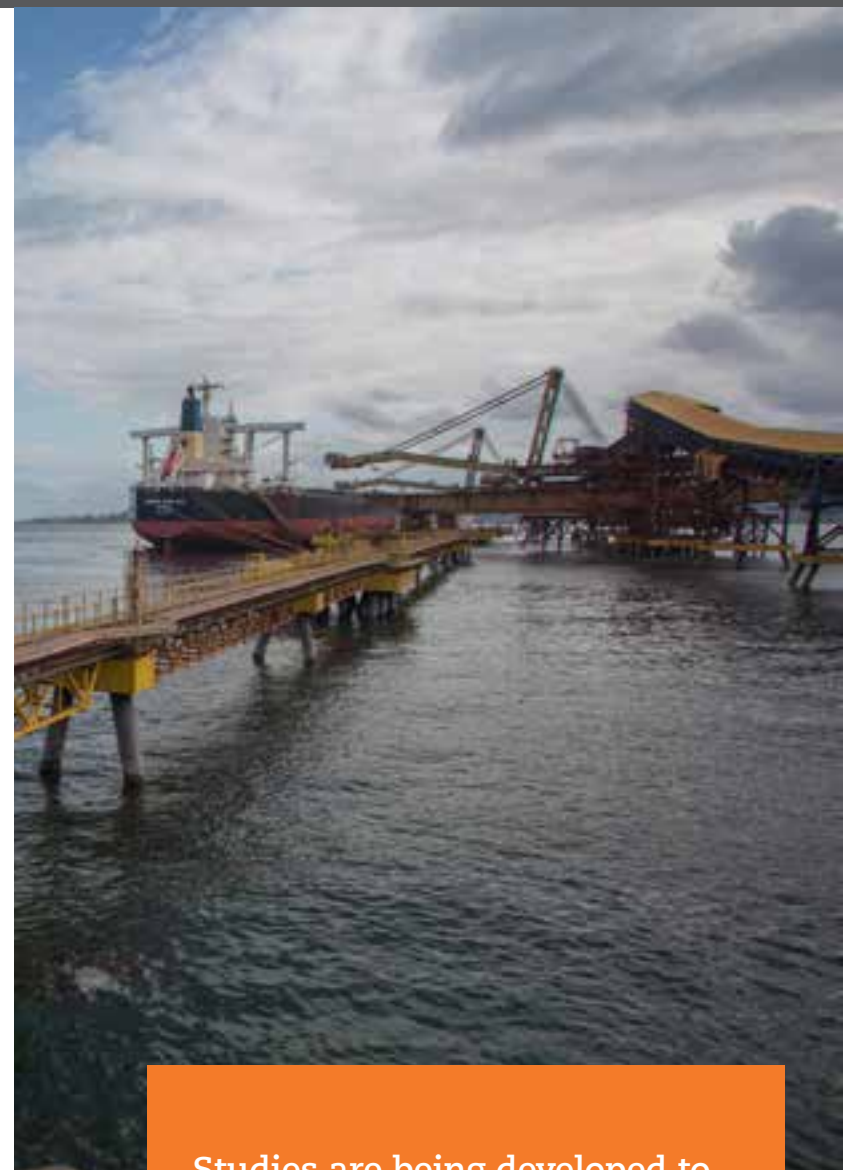
Environmental licensing

At Vale, the installation of operations or the expansion of units is regularly submitted to environmental licensing or authorization processes. The projects are developed to minimize socio-environmental impacts and incorporate mitigation, control, monitoring, and compensation measures.

In line with the requirements of environmental agencies and other bodies involved in the environmental licensing processes for mining activities, Vale has been seeking to not only comply with legal requirements, but also to ratify its commitment to the development of increasingly sustainable projects.

Thus, several socio-environmental indicators that take into account the issues of water, waste, emissions, energy, recovery of degraded areas and critical social issues are monitored in Vale's operations. These indicators are also used as a basis for the Vale's variable compensation program, which links economic and financial performance with operation excellence and sustainability.

Vale has also been developing studies that seek to relate the identified socio-environmental impacts of a new venture and its proposed respective mitigating measures to those already established for operations in the territory. This integration of plans and socio-economic commitments strengthens the synergy between the environmental licensing process and social investment actions, aligning programs, commitments, and the initiatives of the different ventures in the municipalities and communities where there is territorial interface.



Studies are being developed to integrate socio-environmental actions into operated territories

In order to guide the environmental licensing process and meet the need for prior knowledge of applicable legislation and the specificities of the territory of interest, the following management tools and technical guidelines are maintained, applicable according to the location of the venture:

- Best Practices Guide – Environmental Licensing and the Environment, available for Brazil, Canada, Mozambique and Peru;
- SAP Environmental Compliance (SAP EC): a web tool developed to ensure the management of conditions and constraints, further enabling the verification of information by the corporate area;
- Social Action Guide;
- Community Relations Guide for Capital Projects;
- Environmental Education Program Guide;
- Operational License Methodology.

Combined with the work of experts, these documents subsidize the management of the licensing process with the institutions involved, which is essential for the proper planning of projects and for the production and development plans of new businesses. Vale holds most of units certified by ISO 14001 and maintains an internal audit process of the management system that evaluates compliance with environmental constraints and the procedure for updating licenses.

Only in 2016, more than 200 environmental licenses and permits were obtained in Brazil, enabling the expansion and continuity of the Vale's activities. Among them, we highlight, in the State of Pará, the Operating Licenses of the Carajás Iron Project S11D, currently known as the S11D Eliezer Batista Complex, and the Ramal Ferroviário Sudeste do Pará, which allowed for the start of activities of the largest iron ore project in the history of the Vale and the mining industry. In Minas Gerais, Vale's highlight the Preliminary License for the Maravilhas III Dam, essential for the continuity of operations at the Pico and Vargem Grande Complex mines.



More than **200**

environmental permits and licenses obtained in 2016 within Brazilian operations

ISO 14001

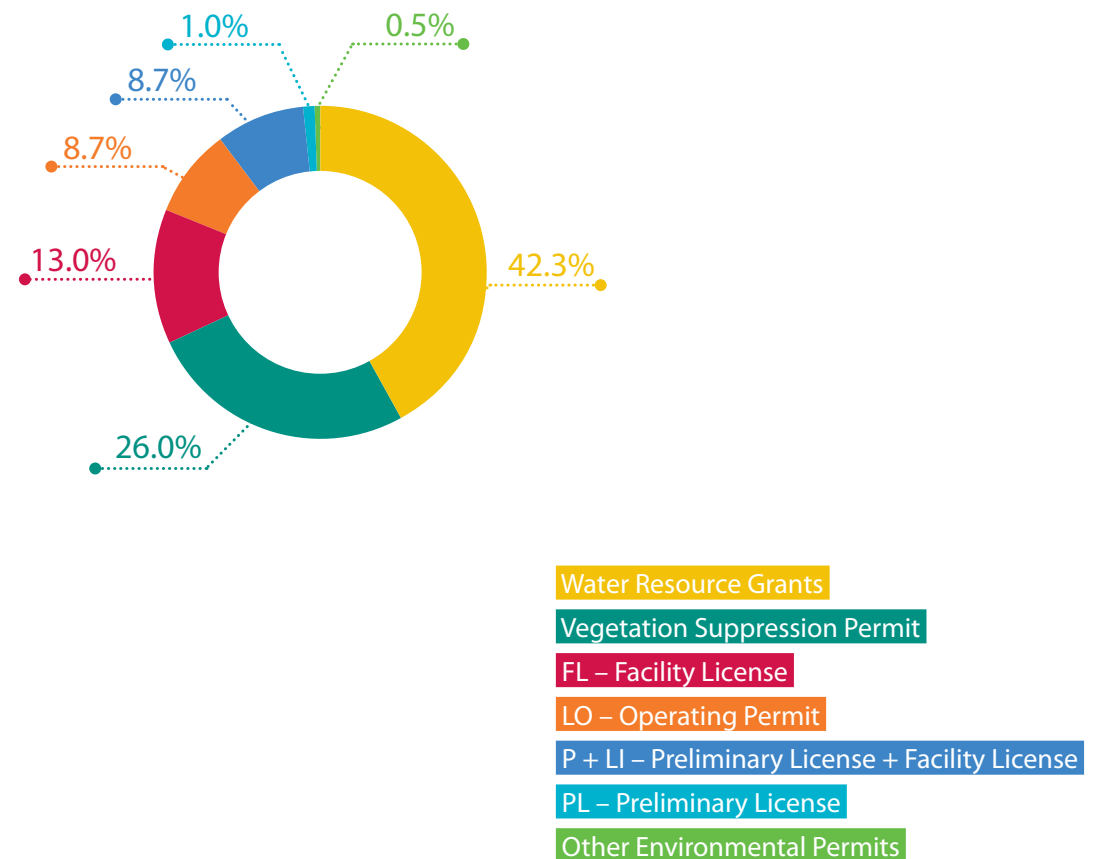
it is maintained in the majority of Vale's units, contributing to the compliance with environmental standards and the updating of permits

The operating licenses already issued for a unit, covering all of the necessary structures to the operation of the ventures, are generally grouped in the revalidations and renewals of Operating Licenses (OL). These revalidations and renewals are categorized as Operating Licenses.

A mining venture includes various activities and associated structures. In addition to the pit where ore extraction takes place; there are structures for beneficiation, tailings dams, overburden piles, logistics and support infrastructure, among others. Thus, the environmental licensing of mining ventures must take into account all of the necessary facilities for the operation, in order to allow for a joint analysis of the intended economic activity. Eventually, in order to maintain or increase the productive capacity of Vale's operating units, the individual licensing of specific structures, such as overburden piles and tailings dams, may be required.

In this context, it is important to highlight that the accident at the Fundão Dam may cause more rigorous conditions regarding the licensing process for Vale's projects and operations, and may result in longer time periods for obtaining permits that involve tailings dams in their scope.

License Types – 2016



Rural Environmental Register (CAR)

In 2016, Vale completed more than 89% of the required Rural Environmental Register, covering data collected from more than 310,000 hectares in more than 1,300 rural properties it was responsible for, located in ten states, of which most are in Minas Gerais and Pará. This result is in line with the legal deadline for joining CAR which, in accordance with Law No. 13,295/16, which revised forest legislation (12,651/12), was extended to December 31, 2017.

Regularization alternatives compatible with the operations, expansions, and projects were evaluated, taking into account the tradeoff between properties, for example, for Legal Reserve, contributing to its ecological function.

Therefore, Vale seeks to take all of the necessary steps to comply with registration and its developments and has obtained important gains, deepening knowledge on the land use characteristics of its properties, by updating the CAR registry.

Business and Operational Risk Management

Risk Management

Vale's Corporate Risk Management Policy defines the guideline that should be adopted in order to seek to minimize events capable of impacting health, safety, the environment, society, finances, and the Vale's reputation. The document, which is in line with the guidelines of the Board of Directors and the Board of Executive Officers, covers market, credit, project, and operational aspects.

Market: includes risk factors such as interest rates, currency, and commodity prices with potential impact on cash flow.

Credit: the focus of attention is on non-compliance with obligations undertaken by clients, financial institutions, suppliers, and other counterparts.

Projects: seek to deal with impacts on investments, terms, safety, and operational performance of new facilities.

Operational: risks capable of causing harm to people, the environment, property, society, and the Vale's reputation may arise from failures or inadequacies of processes, people, systems, or external events. In 2016, coverage was expanded to include certain business risks associated with some corporate processes, such as Procurement, Institutional Relations, and Corporate Finance. Vale seeks to continually develop assessment of operational risks and its management.

Both the operations and feasibility analyses of projects seek to take into account the Principle of Precaution in relation to corporate, environmental, social, and health and safety events. **G4-14**

The Corporate Risk Management Policy covers market, credit, project, and operational aspects



6 thousand

enquiries focusing on human rights, security, and corruption promoted to mitigate risks

This policy is overseen by the Executive Risk Committee, which is also responsible for the revision of principles and instruments at the corporate level, and for provide subsidies for the Board of Executive Officers decisions when applicable. Every quarter, the Committee seeks to assess the main risks identified so far and respective action plans, guided by the standards of ISO 31000. [G4-50](#)

In relation to Internal Control environment, Vale has a set of application controls, automated and of information technology (IT) that seeks to ensure the accuracy of the information disclosed in the financial statements, including provision for asset retirement, registration and execution of environmental liabilities, as well as, the monitoring of any environmental and social lawsuits and their contingencies.

In order to strengthen this range of procedures, Vale conducts due diligence on third parties in Brazil to try to mitigate contracting risks or subcontracting companies deemed not reputable. In 2016, over 6,000 consultations were carried out, covering human rights, safety and corruption aspects, among others. This process is already incorporated into the certification flow of new suppliers in the main countries in which the Vale operates. [G4-2](#)

Freedom of association and negotiation

Vale seeks to respect the freedom of association and negotiation among its employees and does not interfere with the establishment, functioning and management of labour organizations or collective wage agreements. Its Code of Ethics and Conduct also expressly states that discrimination against union membership is not tolerated. Furthermore, Vale stringently complies with the legislation in the countries where it operates and the eight core conventions of the International Labour Organisation (ILO):

- No. 29 – Forced Labour (1930)
- No. 87 – Freedom of Association and Protection of Union Rights Organize (1948)
- No. 98 – Right to Organize and Collective Bargaining (1949)
- No. 100 – Equal Remuneration (1951)
- No. 105 – Abolition of Forced Labour (1957)
- No. 111 – Discrimination, Employment and Occupation (1958)
- No. 138 – Minimum Age (1973)
- No. 182 – Worst Forms of Child Labour (1999)



For more information, please look at "Forward-Looking Statements" and "Risk Factors" on Form 20-F.



96%

the staff was covered
by collective bargaining
agreements that were
renewed in 2016

Since 1989

**no strikes involving employee downtime have
occurred in Vale's main operations in Brazil**

96%¹⁴ of employees were covered by collective work agreements renewed in the year of 2016. Regular meetings were maintained with the unions – so as to ensure a transparent and direct relationship. So much so that since 1989 there have been no strikes in the main Brazilian operations and, in 2016 there was no notification of strikes or interruptions in other locations¹⁵. [G4-11](#)

One of the topics dealt with in dialogue with trade union representatives and in collective work agreements is the dissemination of health and safety culture as part of the challenge to achieve a Zero Harm. The Vale takes into account the concerns and points of view of employee representatives in the definition of mechanisms and requirements for the prevention of accidents and occupational diseases, as well as respecting

local regulations and legislation. It promotes, therefore, training for the use of machinery and equipment, it provides Personal Protection Equipment (IPE), and makes regular inspections in Vale's Operational areas and the maintenance of joint health and safety committees. Employees also have the right to refuse to work in unsafe conditions, which is guaranteed and reinforced in its internal regulation standards. [G4-LA4](#) | [G4-LA8](#) | [G4-HR4](#) | [MM4](#)

¹⁴. The 4% not covered by collective bargaining agreements work in Australia, Paraguay, Argentina, Canada, Taiwan, the UK and Japan.

¹⁵. Prior notification of significant change is not part of the Vale's standard practices and is not included in collective wage agreements. According to the Global Reporting Initiative (GRI), significant changes are those which cause changes to production levels, such as restructuring, the closure of activities, acquisitions and mergers.

Health and Safety





“Life matters most” permeates Vale’s activities, which strives to achieve Zero Damage

See below the commitments of the recently-revised Sustainability Policy, as well as the corresponding Sustainable Development Goals (SDGs), which are covered in the issues addressed in this pillar. This policy guides the general principles of Vale’s and at this report are illustrated some examples related to the respective themes. View the Policy in its entirety at www.vale.com.

Relation to the Sustainability Policy

To be a sustainable operator, Vale will work consciously and responsibly across the life cycle of our projects, from their conception, through their implementation and, operation, to the closure of our activities, respecting the local culture where we operate. Vale will work to develop a sustainable development perspective with respect to Vale’s products and services and their value chains. Our commitments in the areas of health, safety and environmental, social and economic responsibility are:

- To achieve zero harm, generating organizational learning and promoting active genuine care inside and outside Vale;
- To meet legal requirements and continuously improve our processes and products, seeking increased efficiency in the use of natural resources and ecosystem services;

- To manage risks and impacts, adopting elimination, mitigation, compensation and monitoring measures;
- To promote a healthy, safe and respectful working environment;
- To positively contribute to the evolution of our employees’ and service providers’ performance;
- To pursue technological innovation through research and development of new technologies; and
- To work with responsibility, ethic and transparency, engaging with our stakeholders and fulfilling our commitments to obtain and licence to operate.

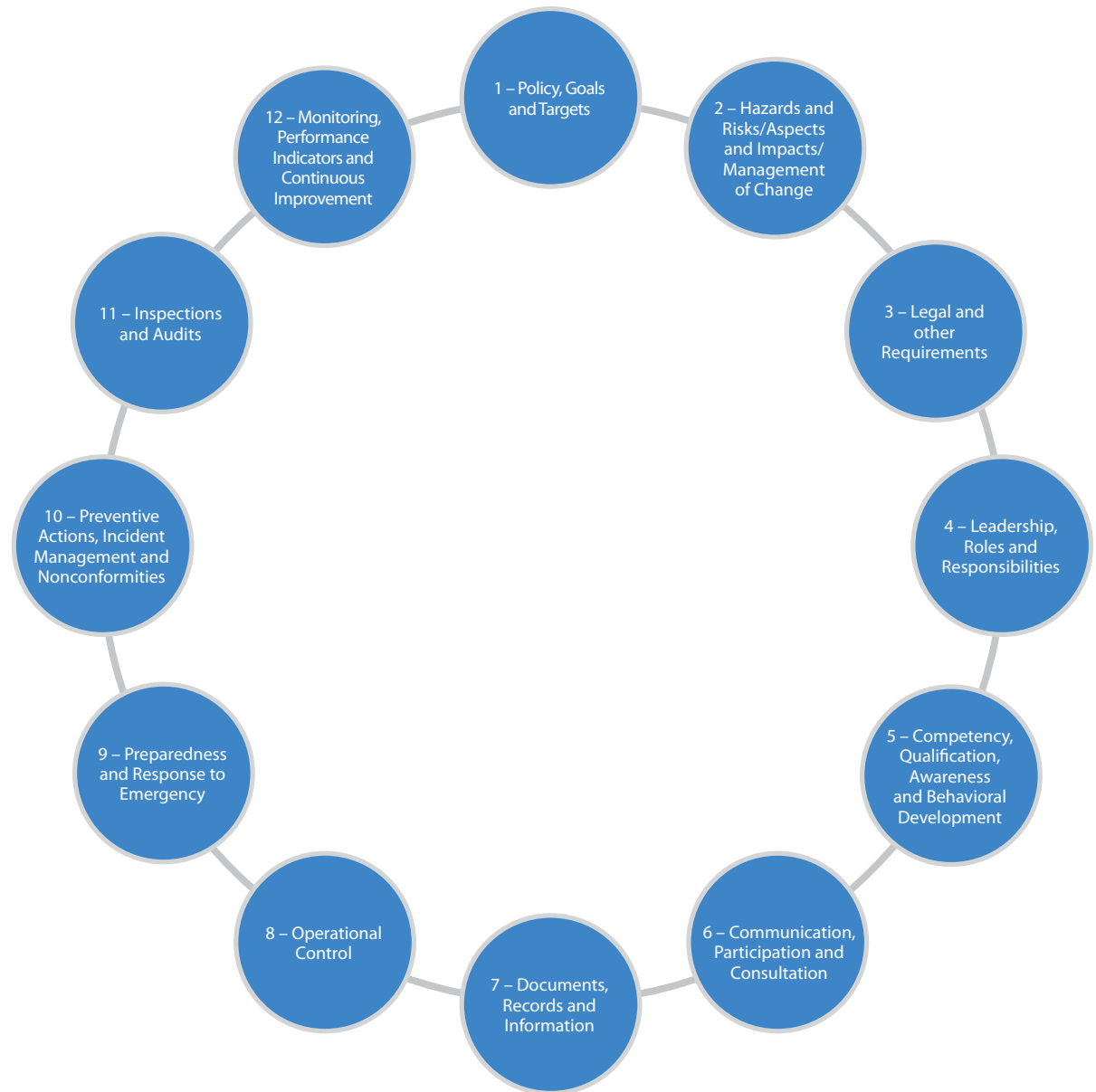
Relation to SDGs



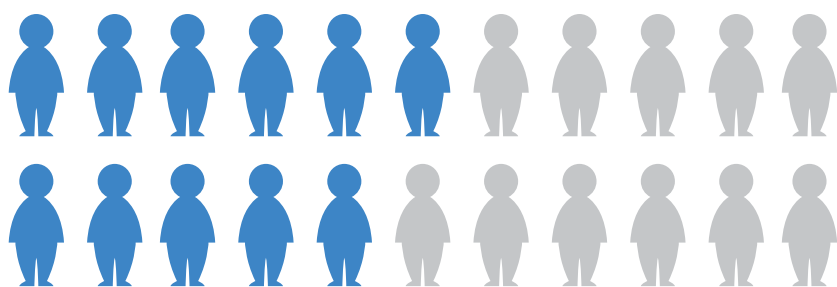
Health and Safety of workforce and community

Health, Safety and Environment Management System – Integrated Management System (IMS)

The management system's aims to manage administrative and operational practices, reduce risks and impacts, gain more efficiency in processes, and reduce costs and effort with individualized management. Vale's IMS, with its 12 requirements, is based on the PDCA Methodology.



Risk and impact reduction
is one of the focuses of the
management system



12 SGI

requirements were undertaken by Vale in its Sustainability Standard, that were revised in 2016

Vale's Integrated Management System

In 2016, having completed the IMS structuring process, Vale revised its Sustainability Policy and Standard. The policy expresses the environmental, socio-economic, and health and safety commitments made by the Company, and the Standard defines the 12 IMS requirements, including its manual as an appendix.

Also in 2016 Vale marked the beginning of IMS implementation, with training, communication, and support activities, which led to a simplification and optimization of documents in operational areas, in addition to corporate regulation documents. Adherence to the system was 75%, higher than the target of 73%, also defined in 2015.

Respect to Life

"Life matters most" is a corporate value that is present throughout Vale's operations. The Vale aims to achieve Zero Harm through continuous investment in development of solutions to prevent injuries and diseases, standardize procedures, manage risks and emphasize the culture of Active Genuine Care – a concept which includes care for oneself, care for others, and allowing others to take care for you.

Prevention of fatalities

In the context of the quest for Zero Harm, Vale keeps fatality prevention programs in place, continually applied and monitored at yours units. They are in line with the organizational learning process, seeking to prioritize good health and safety practices.

In 2016, 120 initiatives were certified as Good Practices of Health and Safety, which means that these practices were already tested and have been proven to contribute with a risks reduction and consequently, a safer environment. The actions are shared so that the areas can analyze the possibility of replicating them, in line with one of the Zero Harm concepts: “Everything is reported to result in organizational learning and continual improvement”.

Seeking to identify opportunities for improvement, especially in connection with potential critical/catastrophic severity incidents, two technical groups met over the year to discuss floor gratings, openings and trap doors, and incident energy, with the participation of professionals with experience in these situations of risk. The discussions involved the analysis of already registered incidents, an understanding of factors that contributed to the occurrences, and the definition of guidelines for action.

With the aim of covering the knowledge on preventive requirements established in Critical Activities Requirements (Rac in Portuguese) 02 – Motor Vehicles, the Online Preventive Driving Training was made available in the Vale Educational System (VES) platform in Portuguese and English for employees who occasionally drive motor vehicles in the service of Vale. In addition, in order to increase access, the RAC Training Guidelines were revised and are available in Portuguese and English.

Despite all of the work and effort, there were five fatal accidents throughout the year, involving direct employees and contractors, whilst involved in operations and working on projects:

- During a gas leakage (one employee, in Brazil).
- During equipment maintenance (one contractor member, in Brazil).
- Related to drowning (one contractor member, in Mozambique).
- During electrical panel activities (one employee, in Brazil).
- During railway level crossing (one contractor member, in Brazil).

In all of these incidents, Vale’s immediate response was to provide support for the families and to analyze situations for the establishment of corrective action plans, which will be monitored up to their conclusion. To avoid recurrences of this type, the lessons learned are also discussed in forums with leaders, and widely publicized to both direct employees and contractors.

Vale’s Ferrosos Sul Operation – Safer and more sustainable operation

The transposition of electrical cables from large excavators is safer in the Vargem Grande Complex in Minas Gerais, Brazil, thanks to the Ecological Walkway project for Electrical Cables (PEC), a practical and sustainable solution aiming to reduce the exposure of employees to risks. In the new system, built using discarded tires from offroad equipment, the walkways replaced the previously used lift towers.

After implementing the project in the Abóboras Mine, various benefits were confirmed, such as:

- A 62% reduction in medium and low risks associated with the service;
- Reduction of certain ergonomic risks;
- Improved employee satisfaction;
- Decreased duration of the activity;
- Reduction of scrap tires for disposal;
- Reduction of expenses.

For these advantages, the implementation of the project in the Capitão do Mato Mine is underway. The idea is to expand it to all other Vale’s areas that move electrical cables.

It encompasses
support for
reporting as a
source of learning
and continuous
improvement

62%

reduction in medium
and low service risks
in the Abóboras Mine
after the adoption of the
Ecological Walkway for
Electrical Cables

120
initiatives

certified as Good
Health and Safety
Practices in 2016



Focus on health

Due to the nature of its business, Vale's work environments may expose its employees and subcontractors to health and safety risks. The Vale strives to identify these risks and aims to apply control mechanisms to mitigate them. In 2016, the following regions in which the Vale is present had incidences of specific diseases:

Brazil – Dengue, Zika, Chikungunya, schistosomiasis, yellow fever, leishmaniosis and Hansen's disease.

Mozambique – Malaria, diarrhea, HIV, and tuberculosis.

New Caledonia – Dengue, Chikungunya, and leptospirosis.

Chile – Dengue, Zika, Chikungunya, and schistosomiasis.

Aware that certain occupational diseases could be prevented, Vale continually aims for the assessment and monitoring of incidences at its units, in addition to aiming to reduce exposure to health risks through good engineering practices and operational controls.

It also maintains occupational medicine programs that seeks it to chart the health of its employees – subject to periodic occupational examinations, in accordance with local legislation. The medical surveillance programs aim to diagnose early signs of disease, investigated and treated as needed.

Simultaneously, the Vale strives to build and maintain a healthy and safe working environment where everyone is able to conduct a process of continual improvement to protect and promote health, safety, and well-being.

As a global company, focused on contributing to the achievement of the Sustainable Development Goals (SDGs), – including the third: “Ensuring healthy lives and promoting the well-being for all at all ages” –, Vale seeks to act especially on the challenges of:

- Reduce the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases;
- Reduce premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being;
- Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol;
- Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

For this, in 2016, approximately US\$2.7 million was invested in campaigns, programs, and initiatives involving Vale and third-party employees in 14 countries.

In addition to complying with local legal requirements, several initiatives were carried out, focusing on the promotion of employee health and takes into account the following themes:

Brazil – Flu vaccination, workplace physical therapy program, employee assistance program; Prevention and approach to substance abuse; sexually transmitted diseases; musculoskeletal diseases; healthy diet, physical activity; monitoring of chronic patients, cancer awareness; tobacco use.

Canada – Prevention of musculoskeletal diseases, mental health, tobacco use.

China – Flu vaccination.

England – *Legionella* control, asbestos training and awareness, cancer training and awareness, mental health awareness, physical activity, physical therapy.

Indonesia – Dengue, Zika, and Chikungunya awareness.

Japan – Physical activity, healthy diet, mental health.

Malaysia – Dengue awareness.

Mozambique – HIV/AIDS awareness. distribution of repellents, mosquito nets for sub-contractors and malaria prevention travel kits.

New Caledonia – Dengue, Zika, and Chikungunya awareness.

Peru – Musculoskeletal disease awareness.

United Kingdom – Monitoring of chronic patients.

Taiwan – Dengue awareness.

In line with the Sustainable Development Goals, Vale seeks to promote well-being for everybody



100
thousand

employees and contractors
involved in the global action
to prevent disease

US\$2.7 million

investment in health campaigns, programs,
and initiatives involving employees and
contractors in 14 countries

Among the health issues addressed by Vale globally, Vale's highlight the following initiatives:

HIV/AIDS awareness in Africa

- Occupational physician giving lectures on HIV and AIDS in Tete, with the participation of hundreds of Vale employees and subcontractors.
- 1000 "life ribbons" donated to the Moatize/ Tete Health, Women, and Social Action District Government.
- Radio program on the world HIV/AIDS day in Mozambique in Mozambique.

Additionally, in Brazil, Vale fully assumes the costs of the AIDS detection test when requested by an employee to a Vale physician, where they are carried out in a network of recommended laboratories.

Malaria Prevention

- Distribution of repellents during the arrival of new Vale workers in Mozambique.
- Distribution of mosquito nets to Vale's contractors.
- Traveler's Medicine: employees receive travel kits during the traveler's check-up.

Internal Global Health Week

The event took place in 14 countries, with the participation of more than 100,000 Vale employees and subcontractors, as well as the participation of the community. Every year, different issues are addressed globally, according to the prevalence of diseases where Vale operates. In Brazil, the events engaged employees and service providers to mobilize in the fight against mosquitos that transmit Dengue, Zika, and Chikungunya, inside and outside the Company. In other countries, preventive actions against regional diseases were encouraged.

During the event, all of the educational content focused on prevention, early detection of diseases, and seeking adequate treatment.

Activities during the Global Health Week included, but were not limited to: educational plays, lectures, group efforts, gymkhanas, educational blitzes in schools, nursing homes, and country clubs.

Some of the main issues addressed during the Internal Global Health Week were:

Australia – Lyme Disease, Murray River Fever and Ross River Virus.

Canada – Influenza, Giardia, and Tuberculosis.

Chile – Chagas disease, Rabies, and Hanta Virus.

China – Influenza.

Indonesia – Dengue, Zika Virus, and Chikungunya fever.

Japan – Lifestyle-related diseases, epidemic measures and mental health plan.

Malaysia – Dengue.

Mozambique (Maputo, Tete, Beira, and Nampula) – HIV, Typhoid fever, and Zika Virus.

Peru – Typhoid fever, conjunctivitis, hemorrhagic Dengue fever, and travelers' diarrhea.

Taiwan – Dengue.

Vale's internal program aims to assist employees in legal, financial, and personal issues

Mental Health Program – Vitória (ES)

A series of lectures at the Tubarão Complex, with the participation of 475 employees on emotional Intelligence, self-awareness, and motivation to assist in work with shift teams (day and night) that made requests relating to the issue.

Employee Assistance Program (APOIAR)

Initiative with the goal of providing advice for employees and their dependents so they can deal with sensitive situations or issues, with specialized counseling in the psychological, legal, financial, and social areas.

Through the program, the employees are helped in legal matters, debt and financial and family planning, family concerns, marital or relationship situations, interpersonal conflicts at work or outside work, support in the care for children or the elderly, life-changing situations, fears, anxiety or crisis, mood changes such as sadness, distress or discouragement, mourning, addiction to alcohol, tobacco or other drugs, among other needs.

Health Program for the prevention and approach to substance abuse

Program with the goal of informing and raising the awareness of employees to the harm of using psychoactive substances in their lives and especially in their workplace, provide conditions for specialized treatment, and guidance on how to avoid the use of psychoactive substances, conduct random testing and, when necessary, provide guidance to the families of employees so that they can become agents in promoting recovery, providing conditions of resocialization for the work, family, and social environments.

Mental health

Vale and the United Steel Workers (USW), in partnership with Laurentian University's Centre for Research in Occupational Safety and Health (CROSH), initiated the Mining Mental Health study in early 2015 to obtain vital information in order to develop key strategies that promote the best possible mental health for the employees. In February 2016, CROSH conducted an initial survey with a group of Vale employees and, based on this feedback, completed the Ontario Operations workforce management survey. During the period of June to September 2016, the CROSH team conducted the Mining Mental Health survey in more than 200 sessions at multiple units. More than 2,200 employees participated by completing the survey, representing a participation rate of 56%. The study now enters its second phase, where the CROSH is collecting qualitative information from individuals who have had an experience with disabilities, in order to understand the

facilitators and barriers of the disability experience, and in returning to work. This work is expected to be completed by the end of the first quarter of 2017. In the coming months, the CROSH team will be compiling the information from the completed surveys and analyzing the data in order to prepare a summary report that will be submitted to the Joint Occupational Health Committee (JOHC). After that, an announcement will be developed for all employees on the results of the study and proposed actions.

Health in the community

The goal of the Vale Foundation's health area is to promote health through the development of community projects that aim to encourage self-care, improve assistance in Primary Health Care Units, and cooperate technically with municipalities in the discussion of best practices for the strengthening of Primary Health Care.

The initiatives are developed based on the appreciation of the participatory methodological process, in which there are reflection and interaction of technical and popular knowledge, productive relationship between the health care unit and the community, and the opening of social participation channels and cross-sectoral practices aimed at strengthening the Unified Health System (SUS) in Brazil.



200
employees

in the survey to
strategies in order to
mental health

**Community projects developed
by Vale aim to encourage self-care
and approve assistance in Vale's
global medical absenteeism index**

Among the area's initiatives are projects focused on training health professionals, community training in health care and social mobilization for health promotion. The Vale Foundation also provides institutional support to projects related to these issues. In 2016, the following projects were implemented through the Vale Foundation: Health Cycle, Casas Populares (Popular Houses) in Parauapebas, Community Diagnosis of Life and Health Care Conditions in Serra Pelada, Healthy Home, Health Care Station, Training in Integrated Treatment of Neonatal Childhood Diseases (AIDPI), Support for the Pastoral da Criança (Child's Pastoral charity), Caregivers in Health and On the Path of Development. [G4-LA7](#)

Check out the details of Vale Foundation projects at www.fundacaovale.org.

Health and safety as part of the business

For Vale, "Take care of our people" is one of its strategic pillars. Therefore, health and safety performance is constantly taken into account in decision-making by the Board of Executive Officers, then replicated to leaders, who in turn seek a reduction of incidents and continuous improvement in the health and safety of our employees.

The health and safety performance improved in 2016 in relation to the two previous periods, as shown in the graphs below¹. They cover Vale employees as well as third-party employees, include injuries with or without leave, and do not include first aid. The calculation also excludes occupational diseases. For Vale Brasil, the rates for health and safety indicators are based on monthly MHW (man-hour worked), which is estimated by the number of employees and contractors (workforce). Data from domestic and international mineral research companies is also taken into account. For Vale Canada and its subsidiaries, Vale Australia and the Moatize Project, the actual man-hour worked are used.

In 2016, the global index of medical absenteeism² for the Vale amounted to 1.94%, while in Brazil, the result was 2.43%. Among the causes for time off work, 89% were for non-occupational reasons, 8% due to occupational health problems and 3% due to accidents in workplace. [G4-LA6](#)

All of the employees are represented on committees which discuss themes related to health, safety and environment. The objective is to contribute to the prevention of accidents and occupational diseases and identify areas for continual improvement in the various processes, and working conditions. [G4-LA5](#)

1. Health and safety management is carried out by each operational department. Thus, the data is not informed by region.

2. Accumulated Medical Absenteeism Index = $\frac{\sum[\text{days absent}]}{\sum[\text{monthly staff} \times \text{days in the calendar month}]} \times 100\%$.

Total injury rate [G4-LA6](#) (number of total injuries/MHW x 1MM)

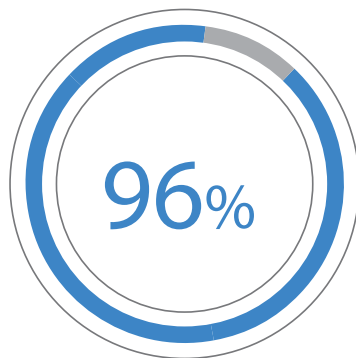


Lost-time injury rate [G4-LA6](#) (number of lost-time injuries/MHW x 1MM)



1.94%

Vale's overall medical
absenteeism index



of employees are engaged
in the item "I alert my
co-workers when I see
them taking risks at work"

78.5
thousand

employees and
contractors met to
reflect on collective
actions aimed at
achieving Zero Harm

"Taking care of people"
is part of the strategy
and performance in
health and safety and
encompasses decisions
of the Executive Board

1,647

badges were offered as
acknowledgements to
employees who act safely

Active Genuine Care Culture

A broadly disseminated concept at Vale, Active Genuine Care was envisaged in all engagement activities promoted in 2016, among which the following stand out:

Pare, Pense e Cuide – Fazendo escolhas mais seguras (Think, and Take Care – Making safer choices)

– Its purpose is to increase safe behaviors, facilitate learning, raise awareness and risk perception, encourage problem solving, and promote engagement.

Day of Reflection – Health and safety event which brought together more than 78,500 employees and service providers to reflect about fatalities, and concepts of risk perception and safe choices, aimed at intensifying collective efforts to achieve Zero Harm.

Internal Global Prevention Week (S&S in Portuguese)

– Under the Fatality Prevention theme, employees and subcontractors participated in activities to reinforce the importance of controls – any measure, rule, or practice aimed at protecting lives and physical integrity – and focus on increasing risk perception in environments.

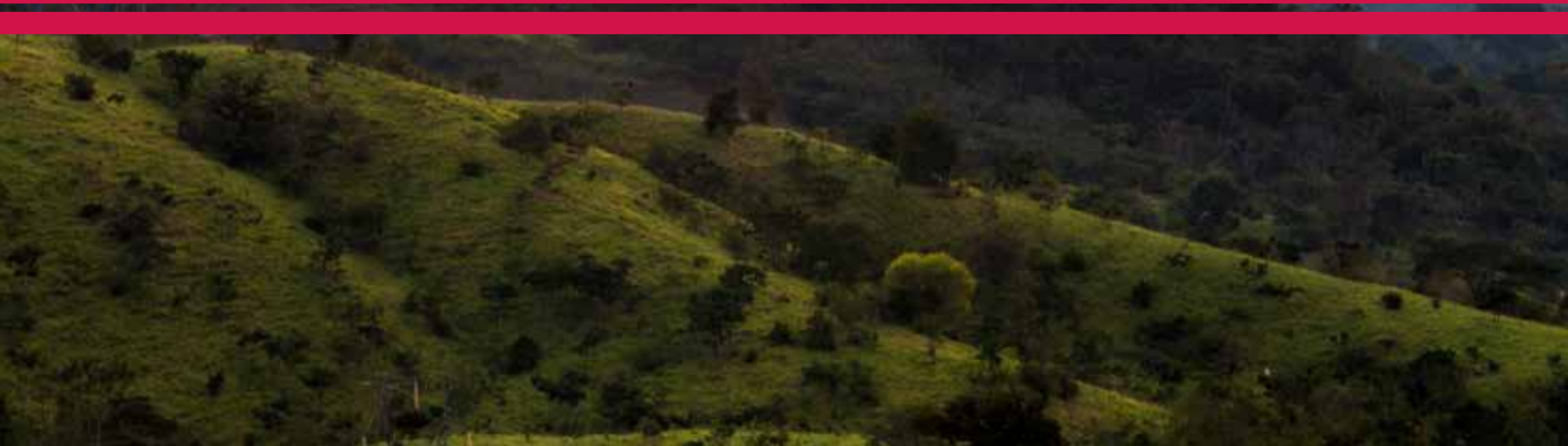
Ambassadors for Care – Recognition of workers that represent the "Life matters most" value. 1,647 badges were distributed.

Sustainability Academy – Launched during the year to expand the employees' knowledge of sustainability. Two classes that included the Zero Harm theme were held.

Global Employee Survey – Of the total number of professionals, 96% responded to the survey favoring the item "I warn my co-worker when I see him taking risks at work".



Local Development



See below, and in the Social Strengthening pillar, the commitments of the recently-revised Sustainability Policy, as well as the corresponding Sustainable Development Goals (SDGs), which are covered in the issues addressed in these pillar. This policy guides the general principles of Vale's and at this report are illustrated some examples related to the respective themes. View the Policy in its entirety at www.vale.com.

Relation to the Sustainability Policy

Operating beyond the risk and impact management of our operations and projects, Vale strives to be a local development catalyst by collaborating towards the socio-economic and environmental development of the territories where we are present throughout the mineral cycle and by establishing cross-sectoral partnerships with the aim of leaving a positive legacy. Vale's main commitments are:

- To support the development and hiring of local workforce and suppliers;
- To understand and monitor the regions where the Vale operates through social and environmental diagnosis;
- To prioritize risk and impact management actions in the planning of socio-environmental expenditure;
- Avoid to fund activities that are part of government's obligation, based on prevailing laws and regulations;
- Develop programs/projects related to social needs, with the long-term economic development vision, avoiding reactive social investments;
- Respect the cultural aspects of the territories, giving priority to communities in vulnerable situations and those directly impacted by our operations and projects, always taking into account the existing public policies;
- In cases where indigenous people and traditional communities are situated in the area of influence of the Vale's activities, specific legislation should

be checked and done, promoting engagement, free, prior and informed consultation and risk and impact evaluation, in order to contribute to the promotion of the ethno-development of these people and communities;

- To focus on socio-environmental investments and individual actions with communities along the following themes: Basic Health Care, Basic Education, Job and Income Generation, Social Protection, Science and Technology and Environmental Conservation, consistently aligned with the existing public policy;
- To work in the area of culture with the aim of valuing the regions where Vale is present and to promote cultural dissemination and exchange, consistently aligned with the guidelines established on this theme by the Company;
- To establish, wherever possible, cross-sectorial partnerships with a focus on contributing to the construction of urban territory management plans and to the development of new economic vocations that promote the sustainability of regions in the long term.

Relation to the SDGs



Through intersectoral partnerships, Vale aims to promote socioeconomic and environmental development in the regions where it operates

Management of the environmental, social, and economic impacts of territorial operations

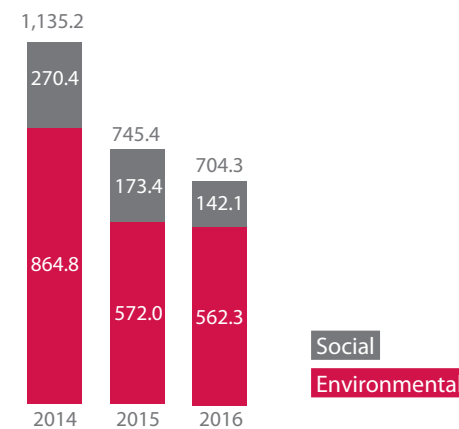
Socio-environmental expenditures

The drive for operational excellence, through the simplification of the Corporate structure, reduction of assets and projects portfolio continue resulting in changes in the distribution and decrease of socio-environmental expenditures compared to previous years.

Expenditures with environmental controls represents 79.9% of expenditures reported this year. Water resources management and atmospheric emissions are the major contributors, representing 57.9% of all environmental expenditures, so as to allow the Vale to fulfill its global water and emissions targets. Vale increased the amounts spent on process improvements and strategies to eliminate or reduce the presence of environmental risk agents to acceptable levels by 125%. [G4-EN31](#) | [G4-EC7](#)

Social expenditures reported in 2015 in the amount to US\$ 228.1 were revised (24% decline) after correcting inconsistencies in the data of a Vale's operating unit in Brazil.

Socio-environmental expenditures (in US\$ million)



125%

increase last year in process improvements and strategies to eliminate or to reduce the presence of environmental risk agents in acceptable levels

Main types of environmental expenditure (US\$ million)

Water Resources	155.8
Atmospheric Emissions	169.5
Recovery of Degraded Areas and Contaminated Areas	37.8
Residues	76.5
Environmental Conservation	53.5
Environmental Management	16.7
Environmental Risk and Emergency	23.1
Other ^I	29.3
Total	562.3

I. For example, environmental studies, compensatory measures, among others.

US\$81.3 million assigned in initiatives aiming to reduce inconveniences to the neighboring communities of Vale's operations

Vale's social activities aim to build a relationship of respect and trust with the communities of the territories in which it operates and is guided by the priorities and specificities of each one, so as to leave a positive social, economic, and environmental legacy.

The Vale prioritizes the investment in social expenditures aiming to reduce inconveniences to neighboring communities through impact management. In 2016, US\$81.3 million was invested in activities with this goal.

Of a total of US\$142.1 million expended, 66% attended to mandatory actions and 34% referred to voluntary social investment. The focuses of

the social investments and specific actions with the communities are primary health care, work and income generation, and social protection. Of the funds, US\$30.6 million is for traditional communities and indigenous peoples, US\$8.2 million to education, and US\$45.1 million to urban infrastructure and mobility.

While sponsorships are regulated by specific regulations, social actions, aligned with policies and standards, are classified as mandatory and non-mandatory, in accordance with the following courses of action:

Types of social expenditure (areas of activity)**(US\$ million)**

Specific Action with the Community	5.3
Specific Institutional Action	11.9
Impact Management	81.3
Social Investment ^I	43.6
Total	142.1

I. 8% of this amount refers to social investments made directly by the Vale Foundation.



Ethnodevelopment

is supported in the initiatives developed in traditional communities and for indigenous peoples

US\$43.6 million

social investment that seeks to provide local development and improving the quality of life of the community

Impact management: empowering, mitigating, compensatory and/or corrective social actions of socio-economic impacts, positive or negative, arising from legal or non-legal obligations, generated by operations and projects. Especially for traditional communities and indigenous peoples, these are actions that aim to support ethnodevelopment, in addition to business and/or judicial proceedings to enable ventures.

Social investment: actions of free initiative, including those required internally (standards and rules), not related to the fulfillment of legal requirements. Thus, social investments constitute actions of a non-mandatory nature, that provide local development and quality of life improvement to the local community.

Specific institution action: actions aimed at supporting the institutional strengthening of organizations, such as the government

(municipal, state, federal), NGOs, Public Interest Civil Society Organizations (OSCIPs), and representative entities (Firjam, Ibram, Military Police, etc.).

Specific action with the community: low-cost and non-mandatory actions for social assistance to the community that promote a closer relationship with the Company.

Territorial Development

For Vale, sustainable development is achieved as its business generates value for shareholders and other stakeholders, with support for social strengthening, for maintaining and improving the health of its employees and neighboring communities, for environmental responsibility and for the socio-economic development of the regions in which it operates. This is possible due to conscious and responsible management, and voluntary business actions and cross-sectoral partnerships.

Most ventures operate in areas with significant socio-economic challenges. In addition to this, mining is an activity that is limited to the mine's life cycle. These aspects require dedicated sustainable development initiatives in partnership with other local players – governments and civil society organizations – or conducted directly with the communities.

In Brazil, Vale and the Vale Foundation maintain actions aimed at a legacy of social well-being, in harmony with the environment, throughout the entire life cycle of the ventures, including support for economic vocations and projects that contribute to the sustainable development of the territories and of the communities. They prioritize the work and income generation, education and health, as well as to the supplementary courses of culture, sports, urban development, social promotion and protection. In addition, the Vale Foundation develops cross-sectoral partnerships to strengthen public policies.

As a principle, the Vale prioritizes the risks and impacts management of its activities, pursuing zero harm to employees and communities, and leaving a positive social, economic, and environmental legacy in the territories in which it operates. The goal of operational risk management is to identify, analyze,

and manage events that can affect any of the spheres mentioned. Socio-environmental diagnostics are carried out to evaluate environmental aspects. In general, social, health and safety, and human rights violation impacts, associated with processes, products, and services are always taken into account. By the end of 2016, more than 35 operational units were evaluated in line with Vale's operational risk management model. [See the potential impact of its activities on page 70. G4-HR9 | G4-SO2](#)

The socio-environmental risks and impacts management is a continuing and systemic process through which Vale aims to identify, assess, control, and monitor socio-environmental changes arising from its projects and operations in the territories. Vale seeks to maximize positive impacts and to decrease, mitigate, and compensate negative ones.

Weaknesses, opportunities, and potentialities for the development of the territory must be identified through diagnostics and monitoring socio-economic indicators, social dialogue, understanding of demands, expectations and needs manifested by the communities located near our operations and projects.

Socio-economic¹ studies and participatory diagnostics² enable impacts to be identified and the mitigation measures to be taken, as well as the needs of each territory and community, thus ensuring the assertiveness of the programs, projects and social initiatives. It also enables a Multi-Year Plan for Social Expenditures to be drawn-up for the short, medium and long terms, facilitating the provision of funds for continuing with the initiatives, which are defined according to challenges faced.

1. Monitoring of socioeconomic indicators is studied by region. In the North system it includes the municipalities most affected by the social and economic impacts of the Company, Canaã dos Carajás and Parauapebas. In the Southern/Southeast System, monitoring is performed in the municipalities affected by Mariana Complex operation.

2. Participatory diagnoses are performed in the communities that receive the most significant impacts of one or more enterprises in all Vale's acting territories in Brazil.

Vale and the Vale Foundation maintain sustainable actions that seek social well-being, environmental balance, and support for economic vocations



Social impacts

are managed through the full dedication of teams of Vale employees, who maintain long-lasting relationships with the communities

The Vale has teams in place dedicated to social action in the territories and permanent relations with the communities, guided by a set of policies and standards, supported by specific tools and specialists. Social action involves processes such as social dialogue, management of the community's demands, management of social impacts and human rights, planning and management of social expenditure, volunteer work and structured initiatives on themes such as human rights and the involuntary removal of people, with special attention given to indigenous people and traditional communities.

In order to deal with the social and economic complexity of the territories, Vale operates

under an Integrated Management Model, with tools for Managing Stakeholders, Demands and Issues, and through the operationalization of Territorial and Executive Environmental and Community Relations Committees. Project and operations leaders jointly decide on more critical socio-environmental issues.

This model of governance promotes synergy, prioritization and strengthening of initiatives through systemic management between impact mitigation and social investment activities. In order to establish and reinforce rules and guidelines on Vale's Social Action processes, new normative procedures related to the theme and in line with the Sustainability Policy were included in 2016.

Programs and practices by operational phase <u>G4-SO1</u>	Licensing/ Implementation	Operation	Closure
Environmental/Social/Economic Impact Study	■	■	-
Social Programs (education, culture, income generation, etc.)	■	■	-
Mine Closure Plan (environmental, social, and economic aspects)	-	■	-
Relationship with Local and Traditional Communities	■	■	■
Management of Social, Environmental, and Economic Impacts	■	■	■
Professional Training for Communities and Employees	■	■	-
Supplier Development Program	■	■	■
Appreciation/Cultural Heritage Protection Program	■	■	■
Other	-	■	-

■ Intense Occurrence – more than six programs implemented

■ Moderate Occurrence – up to six programs implemented

Projeto Novo Rumo (New Course Project) – Family Agriculture Advance

After diagnosing the vulnerabilities of the Córrego do Feijão community in Brumadinho (MG, Brazil), Vale committed to intensify family farming in the region, considering as a premise sustainable development. After the meetings with the Community Association and local institutions, such as Inhotim and Minerações Itabirito, in addition to the municipal government, the integrate operation that resulted in the New Course Project began in 2014. It began with the aim of encouraging local farmers to expand and diversify income generation from the cultivation of greenery, fruits, vegetables, processed products, and handicrafts.

For this, in the idle areas that the Vale maintained in the region, a vegetable garden and a Community Center were built – with a kitchen equipped for the collective production of preserves, sweets, bread, and jam – in addition to an interpretive trail and sensorial garden, where environmental education activities are developed. Leadership and agroforestry courses were promoted and family agriculture and regional handicraft fairs were held.

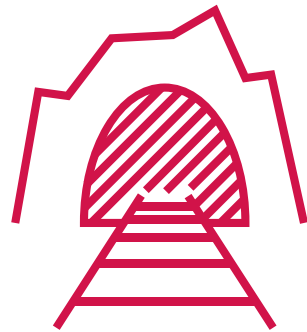
Two years of shared work have yielded good results: most farmers changed the way they planted, adopting Agroforestry techniques and methods, and production significantly increased thanks to the technical support that included mapping the consumer market. Thus, producers began to direct their products to the region's inns and restaurants, in addition to promoting organic fairs in their own community.

Gains also extend to the environment. The construction of the Community Center using Adobe bricks (soil extracted from the construction site), the reuse of utensils from the Vale Discarded Materials Center, rainwater reuse mechanism, and black water treatment system by natural filters involved the community in the discussion on the use of local raw materials and the reuse of materials.

The adoption of Agroforestry Systems methodologies (consortia of crops with tree species that can be used to restore forests and recover degraded areas) still alleviates terrain limitations, minimizes the risk of degradation, and increases productivity. There is also reduced loss of soil fertility and pest attacks, and the possibility of planting more demanding species, due to the cycling of nutrients due to the greater availability of biomass.

The work reinforced several commitments of the Vale's Sustainability Policy, such as:

- Support for social empowerment;
- Socio-economic development of the regions where it operates;
- Voluntary business actions;
- Positive social, economic, and environmental legacy in the territories where it operates;
- Local Development Catalyst respecting local culture;
- Respect for the cultural aspects of the territories, giving priority to communities in vulnerable situations, and directly impacted by Vale's operations and projects, always taking into account the existing public policies.



About 1,900

kilometers of railway network are
operated by Vale

Ferroalloys interdictions and incidents

In Brazil, Vale operates approximately 1,900 km of railway network, which is the equivalent of, approximately, 6.3% of the country's total railway system. It operates the Carajás Railway (EFC), 997 kilometers in length, and the Vitória to Minas railway (EFVM), with 905 kilometers. These railway lines cross through various municipalities with significant socio-economic deficits, many of which have no access to public transport systems or safe-access roads. In these locations, the Vale also operates long-distance passenger trains.

In 2016, 134 interdiction threats were registered at EFVM, of which 75% were neutralized by the proactive efforts of the Vale's relationship teams. In addition to stoppages, the railroad was interdicted for 731 hours – an average of 21 hours per event. All stops were related to Vale's external aspects, specifically the impacts and developments of the Samarco event. Among the impacted cities, 12 are in the railroad's direct zone of influence, along the Rio Doce (river).

Faced with interdictions, the community-driven Compliance with Railroad Interdiction procedure was revised in early 2016. The activities of the teams involved were structured to take into account the new challenges and came to include: (i) Routine – Climate Monitoring, (ii) Threat of Stoppage, (iii) Railroad Stoppage, and (iv) Post-stoppage.

These demonstrations had an impact on the transport of production flows and travel facilities in other communities, as a consequence of interruption and delay to passenger transport, fuel and other cargo. In such cases, the Vale adopts the appropriate administrative and legal measures for the reopening of the track – which is public property and which provides a service which is essential to the country. However, it sought to understand the reasons behind the protests and deal with the protesters' demands.

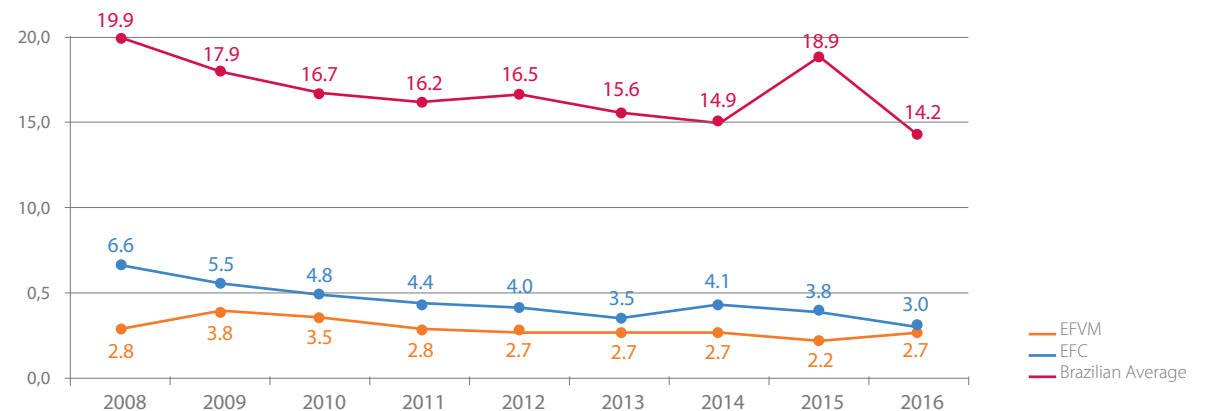
Vale is committed to reducing the number of incidents on its railways. To this end, the Vale has begun a number of initiatives and works with teams that are dedicated to the management, monitoring, assistance and actions aiming to reduce risks. Among these initiatives are the identification of the critical sections that carry environmental risk; monitoring of meteorological conditions; the use of simulators and the holding of training sessions for train drivers; the development of projects of autonomous driving trains; the checking of the rolling stock that travels on the railways; installation of cameras in locomotives; the introduction of improvements to level crossings; construction of upper and lower passages; and the fencing off of the railway at critical locations. Systems have also been adopted such as failure prevention system, the standardization of operations, and education and awareness campaigns in nearby communities.

Coupled with the expansion and permanent acquisition of automatic measuring stations, the CCA has been acquiring and assisting in the customization of specialized software that allows for predicting scenarios, in accordance with the Vale's master plan, and subsidize zoning according to environmental control plans. An example is the acoustic maps generated on a weekly basis, concerning the environmental noise of a certain geographic area. The noise levels are represented in a manner similar to the topographical curves of conventional maps, aiding the decision-making process and preventive mining operationalization activity. The CCA also maintains a permanent visitation plan for employees, environmental agencies, academic/research centers, and various sectors of society, in order to disseminate knowledge and its transparent operation. Through preventive actions, the work is carried out in a manner that does not annoy neighboring communities.

Noise and vibration

The Environmental Control Center (CCA) of Vale's Ferrosos Sul Operations Department, in Nova Lima (MG), which has been in operation for over two years and is equipped with environmental noise, seismography and air quality monitoring equipment, also has water quality monitoring probes this year. The strategy is to monitor abnormalities in real time through internal limits that are more restrictive than legal parameters, in order to provide Vale's Operational area with a more accurate control of the process aiming to avoid environmental impacts.

Number of incidents per million train/kilometer



Source ANTT

Another example is the Vitória-Minas Railroad (EFVM), for which Vale prepared a Structural Plan to reduce noise in operations, aimed at the acoustic comfort of surrounding communities. In 2016, acoustic sealing activities continued in urban areas, through the installation of acoustic barriers between the railroad and the community in the cargo test area.

Systematic initiatives are also carried out and monitored, aimed at reducing noise originating from the railroad, such as the grinding of rails, wheel reprofiling, installation of noise and vibration absorbers (PAD's) on railcar trucks and the installation of railroad track lubrication systems.

Along the same lines, the Vale actively participated in the Working Group responsible for the ABNT NBR 16425 Acoustic project – which measures and evaluates the levels of sound pressure generated by transport systems – for the Railway System, which seeks to establish a measuring system and parameters for sound pressure caused by railway systems. The discussion within the scope of the group extended throughout 2016 due to the high complexity of the issue, whose publication is expected for the end of 2017.

Market presence

The Vale is committed to respecting local realities and their needs, as well as identifying and adopting initiatives, which take into account regional vocations. To this end, it seeks to develop its supply chain, which would result in increased hiring of labor and acquisition of products and services, boosting the economy of the territories.

In 2016, the local hiring rate was 70%, in line with the level³ recorded in the previous year. Just considering members of top management⁴ from the local community⁵, this index was 43%.

3. Vale's employees in this indicator (G4-EC6) correspond to 91% (2016) of the total amount of reported employees (G4-10). In Canada there is no traceability of an employee's birthplace.

4. Managers and directors are considered senior management.

5. Despite the fact that the calculation of this indicator took into consideration the location and state of birth of the employees, the hiring practice, when applicable, prioritizes residents in the state, who were not necessarily born there.



91%

volume of local purchases
in the year, a one percent
increase compared to 2015

70%

was Vale's local hiring index in 2016, in line with
the previous year's result

In 2016, Vale also conducted transactions with approximately 9,000 suppliers in Brazil, Mozambique, and Canada, for the acquisition of long-term materials and services and spot purchases. The value of the acquisitions and contracting amounted to US\$14.2 billion, including Brazil, Mozambique, Canada, New Caledonia, United Kingdom, Japan, China, and Taiwan. The purchases for Brazil correspond to 64% of the amount.

The hiring of labor, products, and services by the Vale seeks to respect the specific circumstances and needs, takes into account regional vocations, and drives development. In 2016, the volume of local purchases⁶ was equivalent to 91% – a slight increase, of one percentage point, compared to 2015 – and the purchases made in the same state/region were 61%, a 4% increase for the same period. In Brazil, the indicators were 96% (national) and 60% (state), one percentage point above and two percentage points below the 2015 volumes, respectively. In Mozambique, local purchases reached 79%, six percentage points more than in the previous year. The expansion was due to a ramp-up moment, with increased

production and the completion of commissioning of the Moatize II plant, which began operating in August. In Canada, performance was 92% (national) and 74% (provinces), a one-percentage point increase in the country and a 0.8% reduction in the provinces.

Biophysical⁷ and socioeconomic impacts

Vale's activities may cause changes to the physical, chemical, and biological properties of the environment and can positively or negatively affect the environmental and social conditions of the territories. The installation and operation of ventures may interfere with the way of life of neighboring communities positively or negatively. Undertake activities in protected forest areas, where parts of the operations are located, requires specific management and differentiated treatment of impacts. The main biophysical and socioeconomic impacts with potential for occurrence associated to the Vale's activities are as follows:

Biophysical

- Alteration in air quality;
- Alteration in levels of sound pressure and vibration;
- Soil loss;
- Alteration in the dynamics and availability of surface and subterranean water systems;
- Alteration in water quality (surface and subterranean);
- Suppression of natural subterranean caves;
- Modification of land relief;
- Modification of landscape;
- Loss of habitat in mining operation areas;

6. Vale considers as local purchases the ones made with the suppliers that are geographically located in the same country and also in the same state of the federation where the operating unit is, except in the case of Mozambique, which are considered local purchases only the ones made in the country.

7. All impacts, when applicable, are dealt with in the course of the licensing processes, where appropriate - the necessary mitigating or compensatory measures are established by the competent environmental agencies.

Vale takes into account regional vocation when contracting commercial partners and two-way partnerships

**US\$84.7
million**

targeting social programs/
projects that are implemented
directly by Vale

**US\$76.3
million**

invested in infrastructure,
including donations and
on-lendings

**US\$14.2
billion**

in expenditures in
acquisitions and contracting
on approximately 9,000
suppliers in 2016

- Fragmentation of ecosystems and border effects;
- Loss in fauna richness and diversity and population reductions;
- Elimination of vegetation specimens and reduction in their respective populations;
- Reduction in vegetation biomass;
- Intensification of soil erosion processes and sedimentation of water bodies;
- Modification of soil properties;
- Reduction in agricultural production potential;
- Escape of fauna;
- Modification of biotic communities;
- Alterations to vegetation physiological functions;

- Increase in the quantity of fauna run-over by vehicles;
- Increase in pressure for clandestine hunting and capturing of fauna;
- Increase in the incidence of animal vector-driven transmissible diseases;
- Creation of ecological corridors;
- Preservation of forest remnants and contribution to maintaining Conservation Units;
- Promotion of scientific research and knowledge generation;
- Carbon emissions from the removal of vegetation;
- Inventory maintenance and carbon sequestration through ecosystem protection and environmental recovery.

Socioeconomic direct

- Change in quality of life;
- Interference in the way of life in neighboring communities, indigenous peoples and traditional communities;
- Change in mobility conditions;
- Possible involuntary removal of families for the installation or expansion of ventures;
- Generation or intensification of conflict for land-use;
- Employment opportunities, income generation and increasing purchasing power among the population;
- Reduction in the number of jobs during the demobilization phase of projects and operations;
- Expansion of the demand for hiring local and regional products and services;
- Training of local suppliers and labor;
- Increase in tax levied and the investment capacity of the public authorities;
- Rescue and protection of archaeological heritage;
- Changes in the conditions of historic, artistic, and cultural heritage



Socioeconomic Indirect

- Migration due to the presence of the venture;
- Increase in real-estate speculation with the increase in housing deficit;
- Increase in price levels and cost of living;
- Increased fragility of public security;
- Pressure on infrastructure and public services;
- Economic development, stimulating expansion in service sectors and commercial activity;
- Increase in the level of professional qualifications among the population;
- Increased formality of the economy;
- Fostering of new local productive arrangements, and consequent interference in local economic activities;
- Change in income generation conditions (agriculture, fishing, street vendors, extractive activity);
- Attraction of public and private investment;
- Generation of scientific knowledge;
- Higher political and economic representation **G4-EC8**

Infrastructure and support to social services

Of the total social expenditure invested in 2016, US\$84.7 million was used in social programs/projects implemented directly by the Vale invested to improve infrastructure and support to services, as shown in the table below:

Funds invested in infrastructure G4-EC7 (US\$ million)	2014 ^I	2015	2016
Donation/Transfer	-	4.8 ^{II}	10.8
Business engagement (shared infrastructure)	-	0.4	-
Direct implementation – social program/project	-	47.2	65.1
Incentive Law	-	-	0.1
Services/Materials	-	29.9	0.3
Total	50.6	88.8	76.3

Funds invested in services G4-EC7 (US\$ million)	2014 ^I	2015	2016
Donation/Transfer	-	7.0	11.1
Direct implementation – social program/project	-	27.8	19.6
<i>Pro bono</i>	-	0.05	-
Sponsorship	-	0.01	0.02
Services/Materials	-	0.1	0.4
Total	50.6	35.0	31.1

I. Categorizations were revised from the 2015 report.

II. Valor revisito conforme informado na página 61.

Vale Foundation

Vale's works closely with the Vale Foundation in its mission of transforming natural resources into prosperity and sustainable development. The Vale Foundation seeks advances in economic and social spheres in the territories where the Vale maintains operations. Its work is carried out locally with the support of a network of partner institutions with recognized experience and thematic expertise. The projects aim to support the improvement of public management, the qualification of social participation, the strengthening of social promotion and protection networks, and entrepreneurship in the communities, respecting local identities. For the maintenance and intensification of the initiatives, Vale allocated US\$16 million to the Vale Foundation in 2016. Of this amount, 42% was directly contributed by the operational areas and included in the indicator of social expenditures.

With the funds, the organization conducted structuring social activities and programs, focused on strengthening public policies, articulating partnerships, and promoting social mobilization. They involve the following areas of activity:

Education: the purpose is to promote integral education, identifying learning opportunities that contribute to the engagement and protagonism of the community and families in their development. The goal is pursued through the promotion of reading and books, the improvement of early childhood education spaces, and the strengthening of Youth and Adult Education (EJA).

Work and income generation: provides support to social businesses and family farming through the promotion of sustainable work alternatives, productive inclusion of individuals and groups, and income generation in communities.

Health: includes community projects aimed at encouraging self-care, improving care in Primary Healthcare Units, and cooperate technically with municipalities in the discussion of best practices for strengthening Primary Healthcare.

Social promotion and protection: seeks to strengthen the rights of children and adolescents focusing on educational actions promoting the protagonism of children and youth, and the prevention of violations of the rights of this segment.



US\$16 million

allocated in the year to actions promoted by the Vale Foundation

Culture: the idea is to increase access to culture and the preservation of Brazilian material and immaterial heritage through the application and management of cultural assets and social inclusion projects using culture as a vector.

Sports: adopting sports as an instrument of social inclusion and human development, and also contributing to children and youth living a more healthy life.

The goal of the initiatives on all fronts is to strengthen communities so that, by appropriating social technologies, they can continue the projects independently. Thus, they enable the development cycle created by mining activities to be sustainable and perpetuated.

This purpose was challenging in 2016 due to difficulties arising from a complex and adverse external environment, both political and economic. In this scenario, the Vale Foundation adopted austerity, but also creativity to overcome obstacle and optimize the experience gained over four decades of work in the social area.

The main strategy was to add skills and resources to work in synergy with its technical team, traditional partners in the implementation of projects in the territories, managers of Vale's operational areas and, above all, new partners in the mining-metallurgical production chain (Vale's suppliers and clients), in order to contribute to the development of the territories of the mining Vale's areas of influence.

Resettlement

Vale has been managing involuntary physical and economic displacements in accordance with the best international practices and guidelines of the International Finance Corporation (IFC).

The processes of involuntary resettlement seek social technical assistance of people, families, social groups and or communities in situations of social vulnerability, ensuring living conditions equivalent or better than those before the process. The measure is applied in the acquisition of rights to use and/or access land for the implementation or expansion of ventures, as well as areas necessary to operational safety and to surrounding communities. [MM9](#)

The Vale Foundation carries out actions for communities to take ownership of social technologies and projects that focus on development

In Brazil, the processes of involuntary resettlement in progress are related to the implementation and expansion of ventures. There were 224 resettlements in the State of Pará related to the acquisition of areas for the implementation of the Southeastern Pará Railway Branch, an expansion of the Carajás Railroad (EFC), in the municipality of Marabá, and the consolidation of processes carried out during the implementation of the following ventures: Onça Puma, in Ourilândia do Norte, and S11D, in Canaã dos Carajás. In Maranhão, 26 assistances were carried out, related to the acquisition of areas for the construction of viaducts that seek to reduce the communities' conflicts of mobility and access. In Goiás, 15 assistances have been carried out for the acquisition of areas for expansion of the Mining-Chemical Complex of Catalão, and in Minas Gerais, in the municipality of Patrocínio, 46 assistances are underway related to the implementation of the Patrocínio Mining Complex.

Project name	Location	State/ Region	Municipality	Provided simple cash compensation (without follow-up)	Resettled through assisted compensation	Through resettlement	Through another method (e.g. social rent)
S11D Logistics – Southeastern Pará Railway Branch	Nova Esperança Community	Pará	Parauapebas	7	4	0	
	Boa Esperança Community	Pará	Parauapebas	22	0	0	
Moatize Expansion		Tete	Moatize	0	0	0	
Project Ferro Carajás S11D	Vila Mozartinópolis	Pará	Canaã dos Carajás	44	1	0	48
	Cosme and Damião Settlement Project	Pará	Canaã dos Carajás	0	0	22	
Salobo Metais S.A.	NA	Pará	Marabá	0	0	0	
EFC – EFC Expansion	Inhaúma, Zé Pedro, Pedrinhas, 3 Bocas e Periz de Cima Communities	Maranhão	São Luís	0	1	0	
		Maranhão	Bacabeira	4	2	0	
		Maranhão	Anajatuba	2	0	0	
		Maranhão	Alto Alegre do Pindaré	3	3	0	
		Maranhão	Bacabeira	7	1	0	3
	Alzira Mutran and Araguaia	Pará	Marabá	39	16	0	21
Mina Carvão Moatize	NA	Tete	Moatize	0	0	0	
Mineração Corumbaense Reunida S.A.	NA	Mato Grosso do Sul	Corumbá	0	0	0	
Mina do Sossego	NA	Pará	Canaã dos Carajás	0	0	0	
	NA	Pará	Canaã dos Carajás	0	0	0	
Project Patrocínio	Mata da Bananeira	Minas Gerais	Patrocínio	5	31	10	
Mining-Chemical Complex of Catalão - Raising Dam	Macaúba and Mata Preta Communities	Goiás	Catalão	8	4	0	3



The process of composing provision, the release of funds, and disbursement is subject to audits

21

progressive asset demobilization actions in 2016, with an allocation of approximately US\$ 15.1 million

Demobilization of assets and mine closure

Vale has a Mine Closure Plan for all of its units, active or inactive, although it has not closed any of its ventures. In 2016, the Closure Plan for the Onça Puma Mine was updated to suit future use, previously projected for the unit (conservationist view) to the local reality (multiple uses).

In order to meet international accounting requirements (SEC – Securities and Exchange Commission) and as part of the flow defined by the Vale for complying with the Sarbanes-Oxley Act, the Provision for Asset Demobilization was updated, in line with the deadlines and disclosure procedures of financial statements. The estimated nominal values for the year were US\$2.5 billion.

In the course of 2016, Vale developed 21 progressive asset demobilization activities, in which approximately US\$15.1 million were invested in the definitive recovery of degraded areas, projects and actions for decommissioning industrial facilities.

The entire process of composing the provision, release of funds, and disbursement is monitored by the Executive Management of the Environment, and submitted to internal and external audits.

For the year 2017, US\$38.1 million was budgeted for the implementation of 32 progressive asset demobilization actions. The amount corresponds to a 151.8% increase compared to the amounts spent in the previous year. **MM10**

One year of the Mariana Accident

Vale understands that certain questions remain about the Mariana accident, and that some may not have answers.. An accident with these characteristics involves complex issues and investigations are still underway.

Still, after a little over a year, much has been done to repair, restore, and rebuild affected areas. You can follow and obtain more up-to-date information at www.vale.com and www.fundacaorenova.org.

Reparation agreement

On March 2, 2016 Samarco and its shareholders, Vale and BHP Billiton Brasil Ltda. (BHPB), entered into an agreement (Agreement) with the plaintiffs of the public civil action of US\$5.8 billion, namely, the Federal Government, the States of Espírito Santo and Minas Gerais, and other governmental authorities (Brazilian Authorities), for the implementation of reparation and compensation programs for areas and communities impacted by the failure of the Samarco dam (Fundão) on November 5, 2015.

On June 24, 2016, the Renova Foundation (Foundation) was established to, under the terms of the Agreement, develop and implement socio-economic and socio-environmental recovery and compensation programs. The Foundation began operations in August 2016.

The Renova Foundation begins recovery activities

As established in the agreement, the entity has undertaken all remedial activities, arising from the failure of the Fundão Dam. The Foundation is a private, non-profit entity named "Renova", in line with its goals of repairing, restoring, and rebuilding the impacted regions by the failure of the Fundão dam, located in the sub-district of Bento Rodrigues in Mariana, Minas Gerais – Brazil. It will be responsible for the 41 socio-environmental and socio-economic programs established in the Agreement, and its headquarters will be in Belo Horizonte (MG), Brazil.

The Renova Foundation, headquartered in Belo Horizonte, aims to repair, restore, and rebuild regions impacted by the accident at the Fundão Dam



US\$614 million

allocated to the execution of programs,
covered in the agreement, that already show
significant progress

Update on remediation and compensation programs

Since the failure of the dam, Samarco and its shareholders have disbursed a total of US\$614 million to fulfill obligations set forth in the Agreement. Progress in the programs has been significant, among which the following stand out:

- Recovery of affected communities and their infrastructure;
- The end or the stabilization and containment of 12 banks of the Gualaxo do Norte, Carmo, and Doce rivers, impacted and listed as priority, is scheduled for 2017, and works on other banks of these rivers should be completed by December 2017;
- 60 of the 101 tributaries of the rivers Gualaxo do Norte, Carmo and Doce were impacted by the rupture of the dam have already been recovered, and works on the others should be completed by June 2017;
- Three water mains and a mobile water treatment plant were delivered. Their total capacities correspond to more than 50% of the water demand in the cities of Colatina and Linhares.

To show the status of the recovery, renovation and reconstruction actions after a year of work, Samarco has prepared a digital book with technical and historical data. You can access it at the following link: www.samarco.com/pt/2016/12/02/confira-o-desenvolvimento-das-acoas-de-reparacao-apos-um-ano-do-rompimento-da-barragem-de-fundao.

To know more recent news on activities carried out by the Renova Foundation, access this section at Vale.com or the official website of the Foundation www.fundacaovale.org.

The Renova Foundation also provides a weekly digital release. The newsletter provides news about recovery activities carried out by Renova, the main challenges faced, guidelines followed, and results obtained. As the name suggests, the purpose of "Conecta" is to facilitate the connection between the institution and society.

11

public hearings should be held by April 2017 to allow community participation in defining TACF content

Public Civil Action for damages in the Valley Rio Doce

In April, Vale became aware of the distribution of Public Civil Action by the Federal Public Ministry in relation to the accident failure of the Fundão dam. The action was distributed to Samarco, BHP Billiton Brasil Ltda. (BHP), Vale, União, States of Minas Gerais and Espírito Santo, National Water Agency (ANA), Brazilian Institute of Environment and Natural Renewable Resources (IBAMA), National Department of Mineral Production (DNPM), Chico Mendes Institute (FUNAI), National Sanitary Surveillance Agency (ANVISA), National Institute of National and Artistic Heritage (IFAN), National Bank for Economic and Social Development (BNDES), State Forestry Institute IEF, the Minas Gerais Water Institute (IGAM), the State Environmental Foundation (FEAM), the State Institute of Historic and Artistic Heritage of Minas Gerais (IEPHA), the State Institute of Environment and Water Resources (IEMA), the Institute of (IDAF) and the State Agency for Water Resources (AGERH), and indicated a value of US\$44.4 billion (based on resources that would have spent in the case of the oil spill in the Gulf of Mexico in 2010 - Deepwater Horizon).

As part of this action, the Preliminary Adjustment Agreement with the Federal Public Ministry was signed in January 2017 to define the procedures and timing of negotiations for the conclusion of a Final Conduct Adjustment Agreement (TACF), scheduled to occur to the end of June. The Preliminary Term establishes

the indication of certain organizations to work with the Federal Public Prosecutor's Office (MPF), in order to assist in the diagnosis of the impacts caused by the rupture of the Fundão dam, as well as in the socio-economic programs proposed under the agreement signed in March 2nd, 2016.

The Preliminary Term also provides for the commitment of Samarco, Vale and BHP to grant certain guarantees to the judgment of the 12th Federal Court of the Judiciary Section of Belo Horizonte. After June 30, 2017, if the negotiations do not lead to a final agreement, the Federal Public Ministry may request the court of the 12th Federal Court of the Judiciary Section of Belo Horizonte to reinstate the deposit orders currently in force within the scope of the Public Civil Actions.

In addition to these commitments, the Preliminary Term also establishes at least 11 public hearings until April 2017, five in Minas Gerais, three in Espírito Santo and the other in the indigenous lands of Krenak, Comboios and Caieiras Velhas. The objective is to allow the participation of communities in the definition of TACF content.

The commitments established in the Preliminary Term were partially approved by the court of the 12th Federal Court of the Judicial Section of Belo Horizonte.



Social Strengthening



See below, and in the Local Development pillar, the commitments of the recently-revised Sustainability Policy, as well as the corresponding Sustainable Development Goals (SDGs), which are covered in the issued addressed in these pillar. This policy guides the general principles of Vale's and at this report are illustrated some examples related to the respective themes. View the Policy in its entirety at www.vale.com.

Relation to the Sustainability Policy

Operating beyond the risk and impact management of our operations and projects, Vale strives to be a Local Development Catalyst by collaborating towards the socio-economic and environmental development of the territories where we are present throughout the mineral cycle and by establishing cross-sectoral partnerships with the aim of leaving a positive legacy. Vale's main commitments are:

- To support the development and hiring of local workforce and suppliers;
- To understand and monitor the regions where the Vale operates through social and environmental diagnosis;
- To prioritize risk and impact management actions in the planning of socio-environmental expenditure;
- Avoid to fund activities that are part of government's obligation, based on prevailing laws and regulations;
- Develop programs/projects related to social needs, with the long-term economic development vision, avoiding reactive social investments;
- Respect the cultural aspects of the territories, giving priority to communities in vulnerable situations and those directly impacted by our operations and projects, always taking into account the existing public policies;
- In cases where indigenous people and traditional communities are situated in the area of influence of the Vale's activities, specific legislation should be

checked and done, promoting engagement, free, prior and informed consultation and risk and impact evaluation, in order to contribute to the promotion of the ethno-development of these people and communities;

- To focus on socio-environmental investments and individual actions with communities along the following themes: basic health care, basic education, job and income generation, social protection, science and technology and environmental conservation, consistently aligned with the existing public policy;
- To work in the area of culture with the aim of valuing the regions where Vale is present and to promote cultural dissemination and exchange, consistently aligned with the guidelines established on this theme by the Company, and
- To establish, wherever possible, cross-sectoral partnerships with a focus on contributing to the construction of urban territory management plans and to the development of new economic vocations that promote the sustainability of regions in the long term.

Relation to the SDGs



Intersectoral

partnerships are maintained by Vale, and are aimed at leaving a positive legacy within the communities

Dialogue and engagement with stakeholders

Community relations management

In 2016, through the Integrated Management Model, 5,117 community requests and complaints were registered, of which 686 are in progress and 222 were not appropriate for the Vale to attend to; the others were duly dealt with during the period. Social dialogue is one of the fundamental tools for dealing with neighboring communities. Through permanent channels of communication and the application of participatory methodologies, Vale shares information and aligns interests and expectations, building solutions together with communities. The direct involvement of local residents in the definition, implementation and follow-up of social actions makes the planning and execution of Relationship and Social Investment Plans possible in the communities in the 54 municipalities closest to Vale operations and projects in Brazil, adhering to local needs and priorities.

The Relationship and Social Investment plans is an engagement strategy that adheres to the principle of mobilization and social participation in the definition and prioritization of social actions in the regions. The structuring of the solution aims to share responsibilities between the Company, the community and other social actors for local development.

Institutional involvement

Vale's participation in forums, institutions, initiatives and commitments keeps it aligned with the broader trends related to sustainable development and the political-institutional issues of the sector, as well as making possible the sharing of good practices and experiences with other companies.

- **Global Business Initiative (GBI) on Human Rights:**

Vale integrates the initiative with international companies from other sectors. The Global Enterprise and Human Rights Initiative seeks to contribute to ensuring that all companies in all parts of the world respect the dignity and rights of those with whom they interact and can have an impact. GBI works in collaboration with the UN Global Compact Office and the UN Working Group on Human Rights and Business.

- **Columbia Center on Sustainable Investment (CCSI):**

Vale is part of this research center, which strives to advance the sustainable development agenda through a partnership between investors, academia and governments, reaffirming the essential role played by responsible investors.

Vale Fertilizantes S.A. (Vale Fertilizantes)

Dams under control

In a demonstration of transparency and genuine concern with safety issues, Vale Fertilizantes structured Key Performance Indicators (KPIs) to broaden the dialogue on the issue, involving mainly neighboring communities and public security agencies. The measure, motivated by the growing demand for clarification regarding the safety of mining dams also boosted internal movement for the revision of risk analyses and emergency plans, in search of the continuous improvement of the process.

The project's implementation process included:

- Identification, in Vale Fertilizantes operations, of structures that, in the event of failure accidents, leakage, or overflowing, may present a risk of significant material loss or loss of life;
- Mapping of communities that could be potentially affected by problems in each of the structures identified;
- Survey of participation need and service capacity of relevant local agencies;
- Updating the activities of Emergency Action Plans;
- Coordination of actions necessary to carry out the plans with the region's Civil Defense, Fire Department and/or Environmental Police;
- Operationalization of the Emergency Action Plans with each of the potentially affected communities.

All this work marked the beginning of an ongoing dialogue that the Vale intends to maintain with communities and security agencies on the subject of dams. In 2016 there has been an approach and clarification of doubts. The expectation is that the communities involved (Araxá, Tapira, Uberaba, and Patos de Minas – MG; Catalão – GO; Cajati and Cubatão – SP; Rosário do Catete, Maruim, Santo Amaro das Brotas, and Barra dos Coqueiros – SE) continue increasingly well-informed and prepared to proceed in a possible dam accident.

- **United Nations Global Compact:** Since 2007, Vale has been a signatory and respects the ten principles¹ proposed by the Global Compact. At the invitation of the United Nations (UN), since 2010 it has been part of the Global Compact Lead platform, which brings together leading organizations on sustainability issues covered in the Global Compact initiative. In addition, it is part of the Swiss and Brazilian networks, forming the Global Compact Brazilian Committee (CBPG). Also, in Brazil it actively participates in the Commission on Sustainable Development Goals (SDG) and the working groups on Human Rights, Energy and Climate.

- **OECD Business and Industry Advisory Committee (Biac):** The Vale monitors and participates in committees relevant to the sector, such as Raw Materials, Corporate Governance, Sustainable Development, Environment, Energy and Commerce. In addition, it participates in the Organization for Economic Cooperation and Development (OECD) as an observer of some committees, such as Steel, and is active in working groups such as the Policy Dialogue for Development Based on Natural Resources and the Consultative Group on Stakeholder Engagement and Due Diligence in the mining sector.

1. The index of this report presents the correlation between practices and performance with the respective principles of the Global Compact.

- **World Business Council for Sustainable Development (WBCSD):** Vale is involved with the development of the 2020 Action project, which aims to highlight ways that companies can play a role in the challenge for a sustainable planet by 2050. It has also been a member of the WBCSD since its inception in 1995. In 2016, the main projects in which Vale participated were: the pilot for the elaboration of a protocol for the valuation of social capital and the working group on water reuse and Finance for Business Initiatives with Social Impacts. Throughout the year, it also monitored initiatives related to the Sustainable Development Goals (SDG), which resulted in the publication of the Vale case on the WBCSD website which covers this topic.

- **Brazilian Business Council for Sustainable Development (CEBDS):** Vale has been associated with the organization as a WBCSD network representative in Brazil since 1997 and participates regularly in thematic chambers and other projects and initiatives. In 2016, its main activities were in the working groups on climate change, biodiversity and water.

- **Sustainable Development Solutions Network (SDSN):** The Vale is a member of the Executive Committee and the Leadership Committee and participates in the discussions of the Good Governance of Extractive Resources thematic group, which brings together key organizations such as the United

Since 2010, at the invitation of the UN, Vale has been part of the Global Compact Lead, a platform that brings together leading companies in sustainability issues

Nations Development Program (UNDP), the World Economic Forum and the CCSI to work on the contribution of the mining sector to achieve sustainable development and the Sustainable Development Goals (SDG), adopted by the UN. In 2016, SDSN produced the SDG Index and Dashboard report, which shows the stage each country is at in the implementation of the SDG.

- **Brazilian Mining Institute (Ibram):** Vale participates through initiatives and programs conducted by the Institute and its partners to promote sustainable development through studies, manuals, guides, research, innovation and the use of modern technologies. [G4-15](#)

Entities and associations

Global

- Centre National de Recherche Technologique Nickel et Son Environnement (CNRT Nickel)
- Columbia Center on Sustainable Investment (CCSI)
- Comitê Consultivo de Empresas e Indústria da OCDE (BIAC) (Business and Industry Advisory Committee)
- Global Business Initiative on Human Rights
- Global Fund to Fight Aids, Tuberculosis and Malaria (Global Fund)
- Inter-Governmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF)
- International Chamber of Commerce (ICC)
- United Nations (UN) Global Compact
- Reputation Institute
- Sustainable Development Solutions Network (SDSN)
- The Cobalt Development Institute
- The Extractive Industries Transparency Initiative (EITI)
- The Nickel Institute
- Voluntary Principles on Security and Human Rights
- World Business Council for Sustainable Development (WBCSD)

Regional

- Brazil Industries Coalition (Bic)
- Brazil-Japan Economic Cooperation Committee (CCE)
- BRICS Business Council
- European Association of Metals (Eurometaux)
- European Steel Association (Eurofer)
- Latin America Iron and Steel Institute (Ilafe)
- Union of the Mineral Industry of the State of Minas Gerais (Sindiextra)
- Union of the Mineral Industries of the State of Pará (Simineral)



National

- Brazil-China Business Council (CEBC)
- Brazilian Association of Science (ABC)
- Brazilian Business Council for Sustainable Development (CEBDS)
- Brazilian Foreign Trade Association (AEB)
- Brazilian Mining Institute (IBRAM)
- Brazilian Rail Transport Association (ANTF)
- Brazilian Study Centre for International Relations (CEBRI)
- Ethos Institute for Business and Social Responsibility
- Foundation for Studies of International Trade (Funcex)
- Global Compact Brazilian Committee (CBPG)
- National Confederation of Industry (CNI)
- Private Port Terminals Association (ATP)
- Queensland Resource Council
- The Indonesian Mining Association (IMAC)
- The Mining Association of Canada (MAC)

[G4-16](#)

Vale develops social dialogue strategies to qualify the actions and increase the confidence of the communities and the government

Dialogue mechanism

Vale considers social development, environmental protection, and the quality of life of its professionals to be priorities, as well as investing in technological innovations aligned with sustainable development.

Believing that development is only sustainable if it generates or shares value among all stakeholders, it identifies weaknesses, opportunities, and potentialities of the territories in which it operates through diagnostics and monitoring of socio-economic indicators, social dialogue, and understanding of the demands, expectations, and needs manifested by the communities. The characteristics of the socio-economic dynamics of municipalities and communities of interest, and the plans, projects, and investments capable of providing transformation in the territory are taken into account.

For this process, social dialogue strategies are developed so as to establish the involvement, transparent relationship, and trust of communities and the government in activities developed by the Company.

In this sense, in 2016, the Community Relations teams in territories in Northern Brazil developed Managing Committees to monitor Relationship Plans and Social Investment with priority communities. The goal is to manage plans and ensure permanent dialogue with the main local players.

Actions such as these are in line with the belief that acting correctly requires constant dialogue with various publics. For this reason, the Vale provides the following communication, consultation, and dialogue tools: [G4-18](#) |

[G4-24](#) | [G4-25](#) | [G4-26](#) | [G4-27](#)

Communication channels	Public audiences (stakeholders)						
	Shareholders, debenture holders and investors	Clients	Employees	Suppliers	Communities	Government & civil society	Press
20-F Reports, press releases, call notices and AGM/EGM meeting minutes, quarterly reports, reference forms	X	X		X	X	X	X
vale.com Portal	X	X	X	X	X	X	X
Visits to operations	X	X		X	X	X	X
Meetings	X	X	X	X	X	X	X
E-mail: rio@vale.com	X						
Telephone +55 21 3485-3900 (IR Department)	X						
Ombudsman	X	X	X	X	X	X	
Investor relations department at www.vale.com	X						
App for iPad – Vale Investors & Media – App Store	X						X
Campaigns		X	X	X	X	X	
Special events		X	X	X			
Satisfaction surveys		X		X			
Contact us		X	X	X	X		
Interactive daily newsletter			X				
Monthly printed newsletter			X				
Noticeboard journals			X				
Intranet			X				
Global Employee Survey ¹			X				
Communication Committee			X				
Social networks			X	X	X		
Structured meetings and collaboration workshops		X	X	X	X	X	X
Vale Supplier Portal (Nimbi platform) ²				X		X	X
Vale Procurement Global Services ³				X			
Conference call	X	X	X	X		X	X

Communication channels	Public audiences (stakeholders)						
	Shareholders, debenture holders and investors	Clients	Employees	Suppliers	Communities	Government & civil society	Press
Telephones and emails		X	X	X	X	X	X
Supplier area on www.vale.com				X			
Committees for communication inter-change					X		
Social diagnoses					X	X	
Socio-economic diagnoses					X	X	
Public hearings			X		X	X	
Social dialogue					X		
Leadership Meeting Program					X		
External disclosure – News					X	X	
Alô Ferrovias (railway hotline)					X		
Contact with Community Relations team				X			
Contact with other areas				X			
Participation in associations and entities				X	X	X	
Participation at conferences, forums and debates	X	X	X	X	X	X	X
Press interviews			X	X		X	X
Pressroom							X
Webcast	X			X	X		X
Visits to the newsrooms							X
Conversation circles			X	X	X		X

1. Quantitative study conducted by the Human Resources Department to all Vale's employees.

2. The Vale Supplier Portal (Nimbi platform) is a virtual space for marketing products and services that interface between the Vale and its suppliers, increasing the integration of purchasing processes, from quotation to payment.

3. Vale Procurement Global Services is a virtual environment created to address problems related to Vale's purchasing chain. It is divided into four subjects: contracts, payment of invoices (nota fiscal), and electronic invoices (nota fiscal) for services

Supplier development

Vale, in line with the purpose of fostering growth, tries to invest in the improvement of its supply chain and in professional qualification. An example is the Inove (Innovate) Program, which stimulates the development of suppliers with training opportunities, access to loans, and incentives for the competitiveness of operations. Among the initiatives is the InoveCapital portal, through which approximately US\$244 million in loans and credits were released in 2016. It is a web-based environment in which suppliers can view their invoices and ask participating financial institutions to anticipate the payment of invoices or obtain financing.

Another highlight of the period was the conclusion of the Vale-Sebrae Productive Chain Program. Throughout the past two years, more than 400 suppliers benefitted from the initiative in the states of Espírito Santo, Maranhão, Minas Gerais, Mato Grosso do Sul, and Pará. Various trainings and consultancies were held, related to financial, contract, and personnel management, quality, customer service, health, safety, and the environment.

[G4-12](#)

Attracting, developing, and retaining professionals

Employees and contractors

At the end of 2016, Vale² had a total workforce of 139,700 including Vale³ and outsourced labor (permanent service providers and projects⁴) and 3,166 employees with fixed-term contracts, trainees and people with disabilities, who will be counted as part of the workforce in 2017.

Out of the total of Vale and outsourced professionals, 109,500, or 78%, worked in Brazil⁵, most of them in the states of Minas Gerais and Pará, which together represented 64% of the national workforce. This is compared to 2015, when there was a 34.5% decline in the number of third-party employees, mostly due to the demobilization of completed projects. [G4-10](#)

2. Biopalma da Amazonia S. A (Biopalma) has 4,200 employees (Vale, third-party, people with disabilities and trainees)

3. Employees with undetermined terms, with the exception of trainees, people with disabilities, employees on leave and employees on unpaid leave, among others.

4. In general, they work in the reform, expansion and new venture works.

5. At Vale S.A., in Brazil, where approximately 61% of the employees work, there is no part-time hiring.

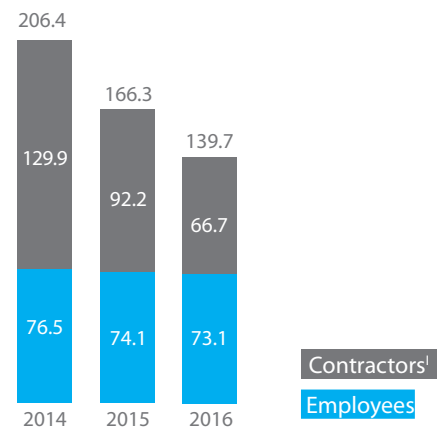
Vale Eco Centre - Malaysia for preservation

One of Vale's values, "Taking care of people", is faithfully expressed in Vale Eco Centre, in Malaysia. Gateway to the Teluk Rubiah forest, the center functions as an educational platform for the local community and other stakeholders, who can discover and appreciate local biodiversity.

This was the case for a group of 37 students from Multimedia University, located in the city of Cyberjaya, who participated in one of the new courses prepared for 2017: "Pollution of the ocean: save or marine life". The program included the participation of EcoMy CEO, Andrew Sebastian, in discussions and presentations on the subject.

The students also participated in monitored trekking through the forest to reach beach areas, where they learned about marine biodiversity and, to finish off, participated in cooperative activities to clean the area.

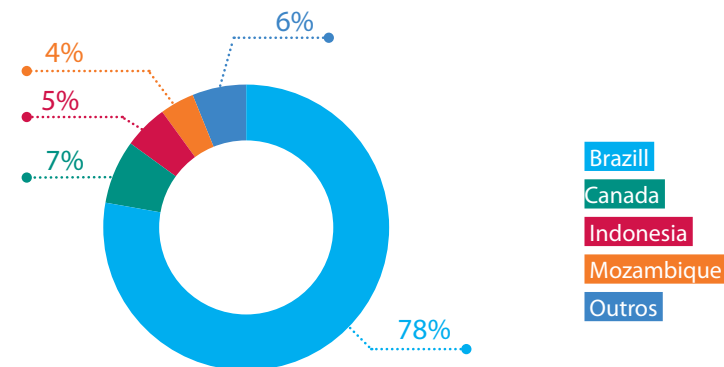
Professional workforce 2016 (in '000)



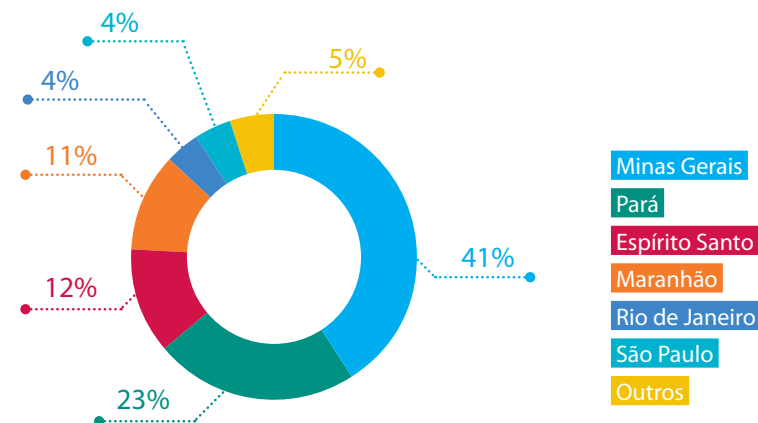
I. Employees and contractors shown in the chart above account for 100% of all the employees reported on G4-10

At the end of 2016, Vale maintained, among employees and contractors, 139.7 thousand employees – of which 78% percent of them were operating in Brazil

Distribution of employees and contractors by country (2016)



Distribution of Employees and contractors by Brazilian state (2016)



Turnover

The employee turnover rate for the year was 7.2%, with an 8.4% rate among women and a 7% rate among men. Dismissals and new hiring exhibited a sharp decline compared to previous years, mainly due to the continued focus on world-class assets and the policy of austerity. [G4-LA1](#)

Compensation and benefits

Vale evaluates the competitiveness of the total remuneration packages of its employees annually, using market research in the localities where the Vale operates. In addition to the base salary⁵, it shares the results achieved over the last year through the Profit Sharing Program (PLR)⁶, which considers team performance and company-wide results.

Also on a yearly basis, the Board of Directors discusses and approves the targets for the CEO and Executive Officers, which are passed on to the teams. The percentage of employees with performance assessments in 2016 was 97.4%. [G4-LA11](#)

The employee benefits policy is aligned with the attraction and retention strategy of each business, respecting current legislation and local market practices. All professionals are given health and life insurance. Most of them also have a

5. Vale respects the legal and mandatory provisions governing salaries and readjustments in each locality where it operates.

6. Eligibility for participation in the program respects labor laws, collective agreements and/or local rules applicable in the localities where Vale operates.

7. Vale employees in this indicator (G4-LA11) correspond to 100% of the total of the employees eligible to participate in the PLR program.

Turnover G4-LA1	2014	2015	2016
General	8.1%	8.7%	7.2%
By gender			
Men	7.8%	8.6%	7.0%
Women	9.6%	9.8%	8.4%
By age group			
Under 30	10.9%	11.0%	10.6%
Between 30 and 50	6.6%	7.6%	6.1%
Over 50	10.6%	10.8%	7.8%
By region			
Brazil	7.3%	8.9%	6.8%
Canada	6.6%	5.6%	4.3%
Mozambique	17.6%	18.0%	29.5%
Indonesia	3.0%	2.9%	2.9%

Note: the turnover rate is calculated by adding the new admissions and annual dismissals, divided by two. The result is divided by the total number of employees from the previous year.

Annually, the Board of Directors discusses and approves targets for the CEO and Executive Directors



97.4%

it was the percentage of employees whose performance was evaluated in 2016

100%

of employees receive medical assistance and life insurance; the majority of which also receive other benefits, such as a private pension plan

private pension plan, personal accident insurance, transportation allowance, educational training, meals at work, food allowance and the employee assistance program⁸. Concerning pension plans, Vale always recommends that they be offered to employees, under the defined contribution model, provided that the financial market of the business locations allows for the long-term management of the resources in a sustainable way.

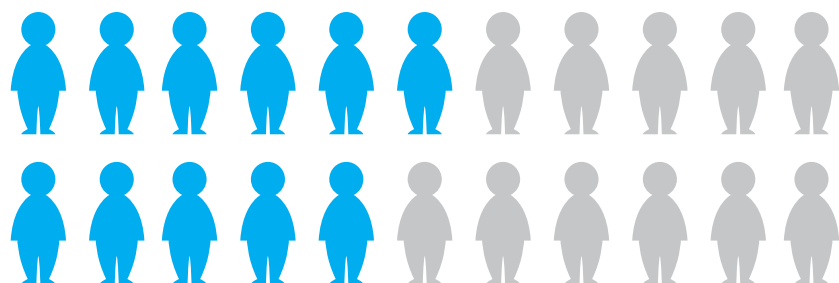
The Vale complies with local legislation for maternity leave, which is 120 days in Brazil, and paternity leave, which is five days. In both cases, there is the guarantee of employment or salary for periods of 120 and 60 days, respectively, after the end of the leave.

⁸. The Employee Assistance Program offers, free of charge and confidentially, social and psychological assistance services and financial and legal guidance to all employees and their dependents.

There is also the reimbursement of part of the expenses related to the hiring of a professional nanny or daycare and preschool fees of children or wards aged between 3 and 72 months. The benefit, valid in Brazil and given to single, widowed or divorced people with legal guardianship of a child by judicial decision can be anticipated by one month in order to provide a period of adaptation for the child.

At the Vale units in Rio de Janeiro and Belo Horizonte, the “Cegonha” Program is in place, which includes guidelines and lectures on health and internal processes, such as vacations, benefits, reimbursements and the return to work exam. The initiative also includes a support room for breastfeeding, so that mothers can extract milk when they return to work after maternity leave.

In 2016, retention rates for returning employees after maternity and paternity leave in Brazil were 87.7% and 94.1%, respectively. [G4-LA2](#) | [G4-LA3](#)



87.7% and 94.1%

were the respective retention rates after maternity and paternity leave in Brazil

Career and succession

The Vale's internal culture of meritocracy is also expressed in the career and succession process, which has the objective of evaluating skill levels and identifying employees' potential to provide them with guidance on their development, supporting management decisions about staff and identifying successors for leadership positions. From the results, the employee and the manager prepare an Individual Development Plan (PDI), based on points of improvement, the Professional career aspirations, the full performance of their current or future role, and the potential for opportunities. In 2016, the Career and Succession process has evolved with adjustments based on best market practices

and internal customer feedback. Transparency in succession reporting and the more qualitative focus on evaluation provided a broader and deeper discussion about the employee.

Also this year, for the first time, the process covered employees at all levels (leaders, staff and operational technicians), resulting in 57,957 people, or approximately 79% of the global workforce employees, that were evaluated and / or received feedback about your evaluation. [G4-LA11](#)

16%

reduction in the number of employees without basic schooling, due to training in Vale's Educational Training Program

3.3
million

hours offered in training in 2016, 4% more than in the previous year

US\$7.2
million

invested in the training of employees that are allocated in Brazil

Development and training

A estratégia educacional da Vale contempla pVale's educational strategy includes processes and functions that are employed as a base for the preparation of the training portfolio. Skills are developed – technical, management, leadership, and transversal (health and safety, environment, respect for diversity, among others) – with the potential to ensure operational excellence. By the end of 2016, the Vale amounted more than 3.3 million training hours in Brazil, an increase of 4% compared to the previous year.

Investments in training in the Brazil totaled US\$7.2 million, a reduction of approximately 7% compared to 2015, due to the need for budget adjustment. The Vale maintained the strategy of the previous period to strengthen the offer of training with internal instructors, reinforcing the Educational Agent program, in which employees are trained to operate as content developers, and in the expansion of knowledge.

Of particular note in the period where the initiatives of the Professional Training Programme (PFP in Portuguese), the purpose of which is to train young people to operate and maintain equipment in the mines, ports, railways and pellet plants. In force since 2008, the initiative is available to young people in Brazil, Mozambique and Malaysia. In the last year, Vale hired trainees in Pará, Brazil, 100% being to meet the requirements of the S11D Project. Along the same lines, various other initiatives continue during the year, among them being:

- Educational Training Program (PFE in Portuguese) Aimed at eliminating deficiencies in basic education among its own technical-operational level employees in Brazil, the Vale maintains the program in partnership with the Social Services for Industry (Sesi). In 2016, Vale supported the participation of 36 employees and enabled a 16% reduction in the number of employees without complete basic schooling.



- Internal Certification – Approximately 3,700 employees participated in the internal certification process – an initiative that seeks to direct investments into training and enable employees to develop the necessary skills for the full and safe exercise of their duties.
- Agents for Education – In 2016, this program was intensified and concluded the period with 1,780 agents operating, responsible for the conducting of 7,476 training classes. This initiative is increasingly important for Vale as it ensures the quality of the courses, in addition to reducing the cost of contracting outside training.
- Continued Higher Education – Priority was given to the training of specialists, with masters and specialization classes being offered in Logistics and Mining to 53 professionals. Also in order to share technical knowledge related to the exploration, mining and logistics businesses, Vale held its third specialists meeting (III Encontro de Especialistas Vale), which brought together over 370 employees in discussion forums on the best practices and trends.
- Further in relation to continuing education, the Global Anti-Corruption Program was developed during the year, totaling 4,339 employees that received face-to-face training, in Brazil and abroad. As part of the initiative, an online course was offered, which trained 23,452 employees in Brazil, Mozambique, Oman, Argentina, China, Canada, Singapore, Switzerland, Malaysia and others countries
- On ethics, the online course “Code of Ethics and Conduct” was offered throughout Brazil and in countries such as Argentina, Austria, China, Japan, Switzerland, Paraguay, Oman, Singapore, United Kingdom, Mozambique, Canada, totaling 48,268 employees trained.
- As for Information Security, Vale trained 43,574 employees in Brazil and in countries such as Canada, Mozambique, Switzerland, Paraguay, and Malaysia through the online course “Information Security – best practices”. The goal of the initiative was to promote the conscious use of Vale information, maintaining its proper integrity, reliability, and availability.
- Business Academies - In 2016, Vale also intensified the training of professionals in corporate roles in the areas of Finance, Procurement, Information Technology, and Human Resources, through the respective Business Academies. Training from the Sustainability and Logistics Academies was also offered. In total, the academies counted 4,924 participations in their courses, which represented 51,801 hours trained globally.
- Leadership Academy - Vale launched this year the Leadership Academy, bringing a new approach to the development of the Vale’s leaders. The curriculum is elaborated with an Advisory Committee formed by leaders of the business areas and established based on our strategy. One of the educational highlights of this year was the live broadcast of HSM Expo 2016, the largest management event in Latin America. The event was attended by about 800 leaders.

For the qualified development of its leadership, in 2016, Vale launched an academy focused in this public and a curriculum based on strategic reach



118 executives

were trained on issues such as Productivity in Mining, Risk and Crisis Management, Health and Safety Culture, Strategy and Execution, among others

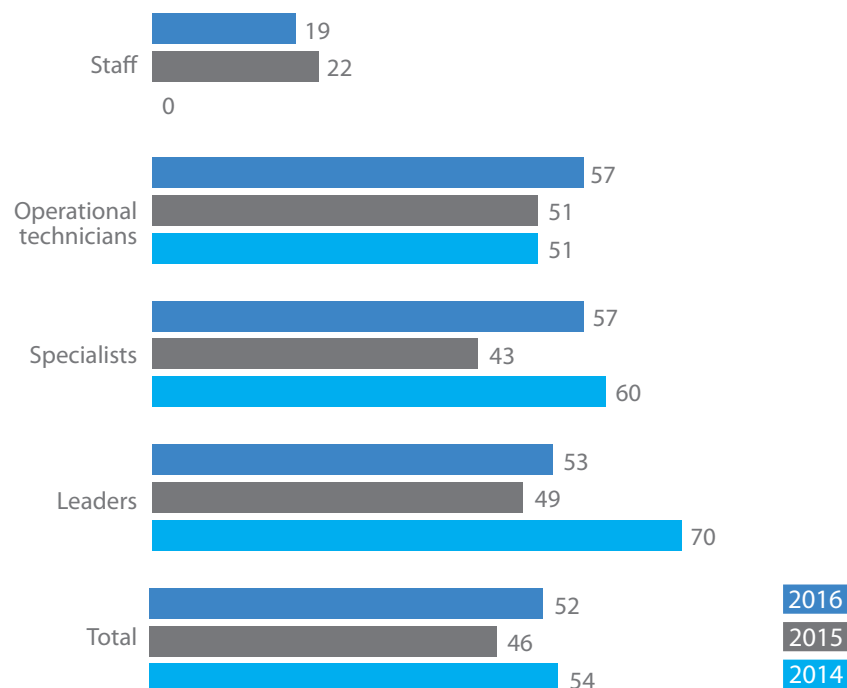
With a specific focus on the Vale's senior leadership, Executive Training offered 8 classes throughout the year, training 118 executives on topics such as Productivity in Mining, Risk and Crisis Management, Health and Safety Culture, Strategy and Execution, among others.

In addition, for a further year, the Community of Leaders, which is Vale's leadership community, continued to foster learning among our leaders, confirming itself as an important development tool. Throughout the year, Vale had 230,772 accesses and 6,727 participations of the leaders in the activities proposed in various actions such as chats with internal and external leaders, polls, talk shows, availability of various development content (podcasts, articles, videos). Vale also held the IV Virtual Meeting of Leadership, when leadership discussed topics such as engagement, people development and innovation.

- Health and Safety – The implementation of training and development initiatives specifically related to the theme of Health and Safety aim to contribute to the dissemination of corporate value "Life matters most" and to the creation of the Active Genuine Care culture (Take care of myself. Take care of others. And letting yourself be taken care of). During the year, there were more than 70 thousand employee participation in training, using training materials constantly updated by about 619 internal trainers involved in training. [G4-LA9](#) | [G4-LA10](#)

Training hour [G4-LA9](#)

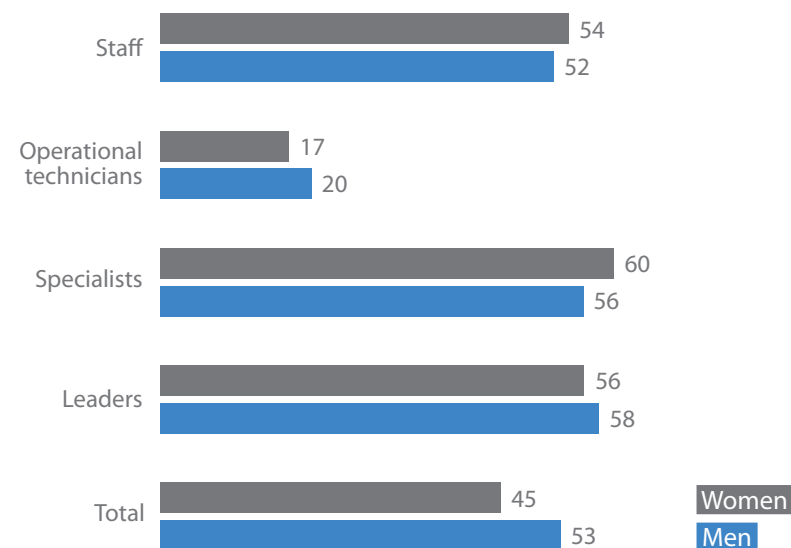
Annual average by functional category



Note: Staff functional category was included at 2015.
Employees covered by this indicator (G4-LA9) correspond to 86% (2016), 92% (2015) and 91% (2014) of the total employees reported on (G4-10).

Training hour [G4-LA9](#)

Annual average by gender^I and functional category



I. Division by gender included this year

Employee engagement

In challenging times, companies need people who have confidence in the business and who are committed to, and aligned with, Vale values. Engaging, developing and rewarding the workforce ensure continued growth, sustainable results and the attainment of the corporate vision for the future.

Under this guideline, Vale launched the “Promoting Engagement” guide in 2016, which, in addition to standardizing the understanding of what engagement is and its strategic importance for the business, orients how managers can engage their teams. The material also gives examples of actions of this nature, according to the characteristics and challenges of each scenario.

Vale has been measuring the degree of employee engagement since 2011 through the Global Employee Survey. By adopting this channel of communication in a regular and transparent manner, it evaluates employee commitment and the willingness to give their best, as well as their perception of their experience with organizational values and the support offered for the performance of the tasks in a productive and efficient manner, maintaining physical, interpersonal and emotional well-being at work. In September, the third edition of the study was conducted

in the form of a voluntary and confidential census, and more than 57,000 Vale employees in 23 countries participated, representing a response rate of 87% – nine percentage points higher than in the previous survey and 13 percentage points above the global benchmark among mining, oil and gas companies. As a result, an engagement rate of 83% was determined.

In order to aid management in the understanding of the results and the subsequent elaboration of action plans together with their teams, the “Leader’s Notebook” was created, which contains detailed explanations, exercises, tips and methodologies for prioritizing actions. In addition, Human Resources business partners have been trained to provide support for leadership in this stage of the process.

The year 2017 will be dedicated to the creation and application of action plans by managers and their teams. The goal is to address areas where there is low employee awareness and involve them in the process of continual improvement. The interpretation of research results and the creation of action plans involving employees and senior leadership ensure a sense of ownership and commitment to change at all levels.

Respect for human rights

Diversity and inclusion

Guided by its organizational values, and by the principles of the Code of Ethics and Conduct and the Human Rights Policy, Vale seeks to adopt practices that focus on diversity and that aim to recognize and promote the individual’s uniqueness. According to the 2016 Global Employee Survey, 74% believe that leadership provides an environment where differences are valued and 80% believe that people with different profiles can succeed in the Company.

Since 2011, Vale has measured staff engagement in global surveys, which further enables us to evaluate the employee’s relationship with the Company

Since 2014, Vale has been a signatory of the Women's Empowerment Principles, UN Women, and the UN Global Compact, which focuses on combating discrimination, among other principles. The Vale is committed to promoting inclusion and promoting equal opportunities by prohibiting all forms of discrimination related to access, remuneration, promotion and permanence in employment.

In 2016, in order to reinforce its global positioning on diversity and raise employee awareness regarding the importance of inclusion, the internal and external communication campaign "We value all differences" was launched, addressing the topics of race, gender, disability, sexual orientation, nationality and region. The action mobilized the entire Vale in Brazil, and for nine weeks, weekly notes were published in the internal communication vehicles and social networking platforms with Vale's views on the matter. The

Administration and the Human Resources Team were trained to discuss the issues with their teams via four virtual meetings, online training on the education management platform, the dissemination of direct communication material and for three presential classes, in São Luís (Maranhão) and Rio de Janeiro. In 2017, we will continue the implementation of new classes to expand the number of leaders and employees trained in the subject.

The Campaign He For She of UN Women was reinforced throughout the year as an opportunity for reflection and internal engagement around gender equity. Also in 2016, and in line with the commitment to include people with disabilities, specific campaigns were carried out, among them the campaign "Indicate Vale for People with Disabilities (PCD in Portuguese)". As a result of the campaign we had a 182% increase of registrations of these professionals in our bank of resumes.



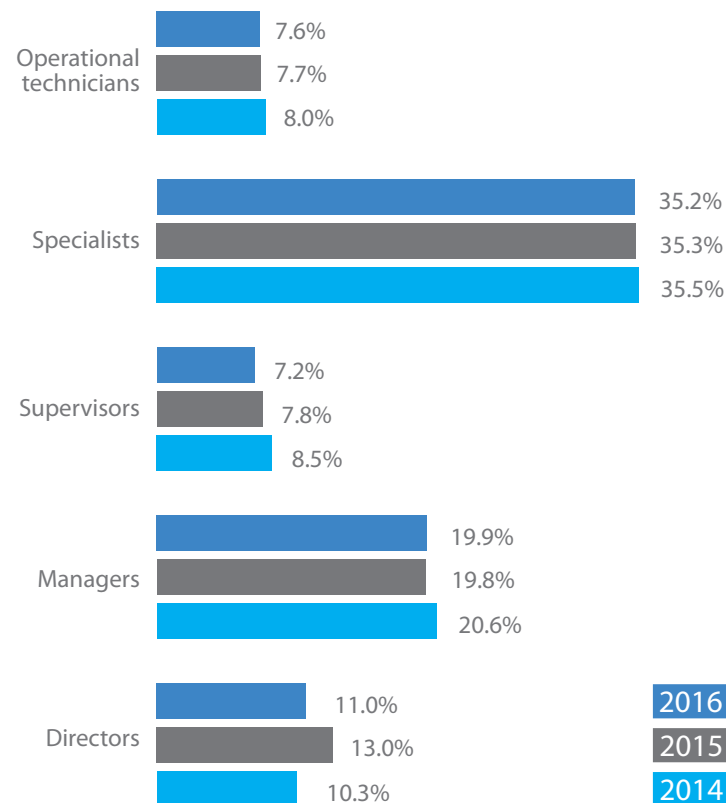
80%

of employees believe that people of all profiles can succeed in the Company

182%

was the increase in submissions from People with Disabilities (PCDs) in Vale's resume database in 2016

Proportion of women by functional category



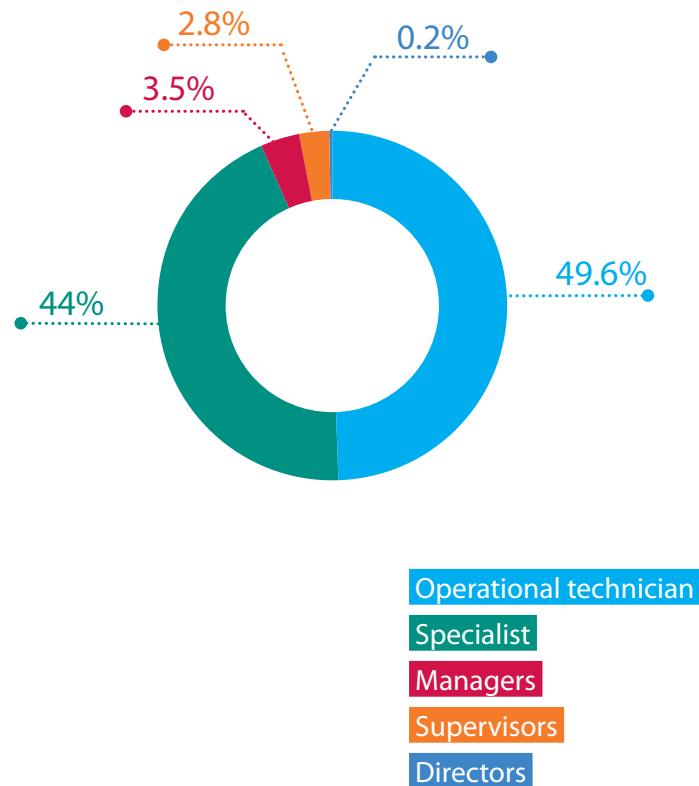
In the same year, the percentage of women in the Vale workforce was 12%. Among the professionals, 49,6% occupied technical positions (operational and administrative), 44% were in specialist areas (analysts, engineers, geologists etc.), 2,8% were supervisors and 3,5%, were managers or coordinators. The Board of Executive Officers, the Board of Directors and the Fiscal Council are composed of 34 professionals, and in the first professional category there is one woman⁹. With regard to the age groups, ten are between 30 and 50 and 24 are over 50. [G4-LA12](#)

There is no difference in the base salaries of women and men who perform the same functions, as determined by the Compensation Policy. The possible variations arise from different levels of seniority and maturity of employees in their positions. [G4-LA13](#)

⁹ The position of Executive Officer, Human Resources, Health and Safety, Sustainability and Energy was occupied by a woman, Vânia Somavilla, until August 2016.

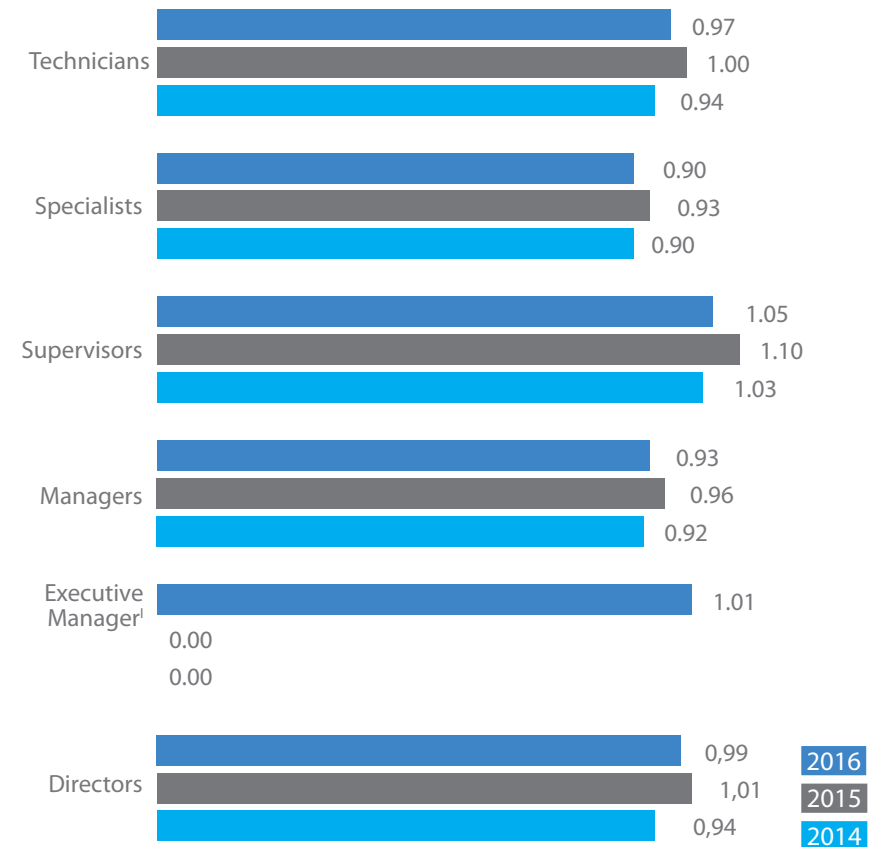
Note: Vale's employees of this indicator (G4-LA12) correspond to 100% (2014-2016) of the total number of employees reported (G4-LA10).

Distribution of women by functional category-(2016)



Note: Vale's employees of this indicator (G4-LA12) correspond to 100% (2016) of the total number of employees reported (G4-LA10)

Proportion of women's salary to men's salary by functional category



I. Professional category considered from 2016.

Note: employees of this indicator (G4-LA13) correspond to 98% (2016), 99% (2015) and 98% (2014) of the total number of employees reported (G4-10)..

Human Rights

Vale developed its Global Human Rights Policy in 2009 aligned with the United Nations (UN) Human Rights and Business Matrix and in 2013 revised its Policy to align with the UN Business Principles and Human Rights Principles. Based on the Policy and Guiding Principles, Vale established a system for managing the issue focusing on processes, policy, evaluation, integration, monitoring and reporting, and mechanisms for complaints and complaints.

In terms of improvements achieved in 2016, the Vale became a member of the Voluntary Principles on Security and Human Rights, an initiative that guides companies and governments to respect human rights in security activities.

In line with the evolution of its practices, in addition to the operational risk management model, Vale has also developed a normative for the treatment of allegations of human rights violations that follow a certain flow.

The model allows the process of handling allegations to become another tool for managing aspects of human rights, focusing on critical issues.

Another initiative was the Global Sustainability Policy, which covers various aspects of human rights, in the dimensions of Sustainable Operator, Local Development Catalyzer, and Global Sustainability Agent, including the issue of Free Consultation, Public Consultation and Informed Indigenous Peoples in the areas of influence of our projects.

At the end of the period, the supply chain accounted for 60,000 active contracts with companies in 63 countries¹⁰. Approximately 60% of these suppliers operate in Brazil, classified as an extreme risk of forced labor or labor analogous to slavery, according to Verisc Maplecroft analysis (maplecroft.com), which reinforces Vale's need for tightening control measures. For this reason, upon signing the contract, the suppliers also signed the Supplier's Code of Ethics and Conduct, agreeing to the Vale's principles and values, which prohibit the adoption of child labor, forced labor, or labor analogous to slavery. The Vale has also inserted a sustainability clause in its contracts with suppliers globally, specifying the requirement to comply with its Supplier's Code of Ethics and Conduct and promulgate the values contained in its Sustainability Policy and Human Rights Policy.

[G4-HR5](#) | [G4-HR6](#)

¹⁰. In 2016 no evaluation of Human Rights was made, because Vale don't carry out mergers and acquisitions. [G4-HR1](#)

¹¹. For contracts with service providers, the country considered is that in which the contract was signed. For suppliers of materials and equipment, the supplier's country of origin is considered.





90%

of the entire Health and Safety workforce were trained in human rights

1,200

suppliers evaluated in relation to legal risks and in health and safety aspects in 2016

At the moment of registering service providers hired on its premises, Vale seeks to verify whether legal obligations have been met, and whether there are any pending with either the INSS (Brazilian social security system) or the Guarantee Fund for Length of Services (FGTS in Portuguese), as well as environment, business security, and health and safety aspects. During the year, 675 new suppliers were registered after the process of verifying these aspects. Any prospective suppliers for whom irregularities have come to light, and who show unwillingness to resolve them, are refused registration.

Contract managers are required to ensure that suppliers comply with Vale's policies and legislation of the places where they operate, including verification of adequate workload, remuneration and other legal labor obligations in addition to complying with the Universal Declaration of Human Rights.

Periodically, consolidated evaluations are performed, both on the performance of the suppliers in the execution of their contracts and related to the risk of the suppliers. The evaluation is carried out with 1200 suppliers and of these 150 presented greater risk potential. These suppliers are monitored periodically with the possibility of blocking for new hires. [G4-HR10](#) | [G4-HR11](#)

In critical cases, Vale, based on fairness, acts to guarantee the rights of outsourced employees. [G4-HR2](#) | [G4-HR7](#)

Security Practices

Since 2008, Vale has promoted human rights training for professionals in the area of Business Security. In 2016, more than 3,000 third parties and 162 employees were trained in nine countries, including Brazil, Mozambique, Indonesia and Peru, representing 90% of the total.

The practice is in line with the guidelines of the Vale's Human Rights Policy and as of 2017, in accordance with the Voluntary Principles on Security and Human Rights guidelines, to update the theme biennial recycling courses.

Critical issues

In spite of all the controls presented, in February of 2015, the Ministry of Labor and Employment (MTE) supervised the Pico Mine (MG), specifically the Ouro Verde Vale that provides transportation services for finished products. Because of alleged irregular outsourcing, as well as the submission of workers to the condition analogous to slavery, the ministry filed infringement proceedings against Vale. These tax assessments were all challenged by Vale.

At the time of the inspection, the contractor was formally and immediately notified by Vale to provide improvements at the construction site and to remedy the irregularities. The work activity was paralyzed and resumed three days later.

In July, the Vale entered into an agreement with the Federal Labor Prosecutor's Office, reinforcing its commitment to the compliance with standards applicable to the working environment of its employees and collaborators. Ouro Verde entered into the same agreement.

Even though the responsibility for the working conditions of Ouro Verde's employees is attributed to Vale, the classification of these irregularities as "labor analogous to slavery" is not appropriate, because all of Ouro Verde's employees were properly registered, with working papers signed and wages paid, operating air-conditioned trucks to protect them

from the dust and heat, and transporting them to their homes every day in safe and adequate transportation. There were no occurrences of retention of documents or the indebtedness of employees by and to Ouro Verde.

Vale repudiates any and all forms of disrespect for human rights and decent working conditions, and has been doing everything in its power to remedy the situation and ensure that it does not recur in its projects and operations.

In 2016 an external Vale was contracted to provide a detailed diagnosis in all of Vale's units in Minas Gerais, verifying the physical conditions of installations and issues related to the availability of basic hygiene and drinking water, as well as the legal aspects of Sanitary Conditions and Comfort in the Workplace, regulated by the Labor Ministry. The result of this diagnosis was filed with the Federal Labor Prosecutor's Office, to be broadly and freely consulted by stakeholders. The actions established in the agreement with the Labor Ministry have been fulfilled, both by Vale and Ouro Verde.

Internal groups were later structured to identify and carry out continuous improvements in facilities and workplaces. The improvements have been applied and the results monitored in the meetings of area leaders. The contract between Vale and Ouro Verde was canceled and, until the end, inspections conducted by Vale were intensified. The contract management area also strengthened the inspections of contracted service providers to verify compliance with all the criteria of the agreement entered into with the Federal Labor Prosecutor's Office. [G4-HR6](#)

Vale has subscribed to the Voluntary Principles on Security and Human Rights, which guides companies and governments on human rights in security activities

Samarco Accident

The failure of the Samarco dam in November 2015, in Minas Gerais, impacted the communities downstream from the dam and residents of the banks of the Rio Doce (river). Samarco's shareholders, BHPB and Vale, provided immediate support for Samarco to implement emergency rescue and relief measures for the victims and, immediately after, social remediation and environmental recovery programs. Read the full report of the accident and remediation process [on page 77 of this Report](#).

Conflicts over land use

Most of Vale's undertakings are located in remote areas, where there are indigenous people and local communities living adjacent to the operations. The land and its resources are of fundamental importance to these communities because, in addition to being where they live, it also forms the basis of their subsistence.

According to the legislation, maintaining the integrity and security of railway rights-of-way are the Vale's responsibility. Both on the Vitória-Minas Railroad – EFVM and the Carajás Railroad

– EFC, the zone of influence includes irregular occupations, whose physical relation with the railroad is consolidated. Vale has been monitoring and avoiding new occupations as a way to resolve conflicts. Especially in the EFC, there are still disagreements related to infrastructure and mobility, which are being attenuated by the construction of overpasses on level crossings.

In 2016, Vale dealt with 151 cases of conflict over land use, which involved manifestations and a number of stoppages to operational units.

Most of the conflicts are concentrated in the northern region of Brazil and are motivated by demands for improvements in infrastructure and urban mobility, mainly due to the conditions of the local and municipal roads. The majority of them are unpaved roads, including ways of expansion and maintenance of the EFC and access roads, also used by the various communities located along the railroad. With the volume of traffic of heavy vehicles due to works of expansion of the railroad, the trafficability in the accesses became even more complex.

Among them, seven stoppages refer to the demands of indigenous peoples. In Maranhão, they involved the Awá-Guajá people, who raised questions with the government, and the Gavião people. In Pará, there were three situations involving the Gavião Xikrin do Cateté and Kayapo peoples. The last two were manifested in the ambit of Onça Puma's environmental licensing process and in relation to the ongoing Public Civil.





Relationships

are managed to promote mutual benefits,
which is why Vale retains professionals with
indigenous experience

Furthermore, in Espírito Santo, there was a conflict because of the Samarco accident involving the Tupiniquim people. Vale has been supporting Samarco from the beginning in serving the affected communities, working in partnership in issues including the handling of indigenous issues.

The Vale has a number of professionals on its staff with multi-disciplinary training and experience in indigenous matters that implement the training of employees and suppliers who have an interface with indigenous people in areas influenced by the Vale's operations. The purpose is to establish a constructive, mutually beneficial relationship, based on respect for cultural diversity and the specific rights of indigenous peoples and traditional communities in the areas of influence.

The community relations teams and specialist deal directly with local leaders. Relations with some communities require special attention due to the history of conflict and social vulnerability. In this way, the Vale prioritizes the management

of conflicts through dialogue. Sometimes it is necessary to take a particular case to the courts – a situation in which Vale's seeks resolution and acts with respect for the rights of those involved, negotiating agreements which facilitate assistance and the preservation of cultural and social identities, as well as the development of the territory. All these cases are duly monitored with the aim of resolving the situation. [MM6](#) | [MM7](#)

Indigenous peoples and traditional communities

In 2016, Vale created multidisciplinary teams to intervene in relations with traditional communities and indigenous people. Guidelines were established that focus on long-term relationships, aimed at fostering ethno development.



63

traditional communities and
indigenous peoples maintain
relations with Vale

The Vale has been working on improving its management strategy with the intense training of its employees and third-party employees, the constant review of processes and the development of planning and support tools. It has kept up, renewed and created new agreements with indigenous people to establish solid partnerships.

Vale has relations with 63 communities, of which 36 are traditional and 27 are indigenous peoples. The traditional communities are split between 35 in Brazil and 1 in Malaysia. Indigenous peoples are distributed between 12 in Brazil and 15 abroad, located in Canada, Australia, Indonesia, and New Caledonia.

In Brazil¹¹, the projects and operations include agreements with 17 communities, mitigation programs in 26 other communities, as well as several relationship actions. [MMS](#)

In compliance with the environmental permit commitments, 100% of employees, both Vale and third-party, who had interactions with indigenous people, received training in 2016. The idea is to make them aware of specific aspects of indigenous culture, fostering respect and good relations. The indigenous and quilombola communities also receive updated information on operations and projects. In addition to periodic meetings, visits and dedicated professionals, the program includes support tools such as banners with pockets that allow for the permanent exchange of information.

¹¹. In the States of Pará, Maranhão, Minas Gerais, Espírito Santo Sergipe.

The platform developed to aid in the planning and management of the issue also allows for the monitoring of critical issues, formal agreements, legal obligations and the voluntary initiatives of the Company. In 2016, 12 critical issues were monitored, of which 83% are being resolved and 17% were already addressed and completed. At the same time, 61 Agreements with indigenous people in Brazil were created and more than 140 obligations resulting from legal commitments.

Also in 2016, the programs foreseen in the Basic Environmental Plan of the Carajás Railroad Expansion Project for the traditional communities and indigenous people in Maranhão were initiated, even before the installation permit was issued. Some actions of a more urgent nature were selected with the natives and started as soon as the terms and conditions were approved by IBAMA and FUNAI.

Internal normative processes have also been improved. This includes the Global Sustainability Policy, a public document that includes aspects of indigenous rights and ratifies the prior, free and informed consultation of traditional communities and indigenous people.

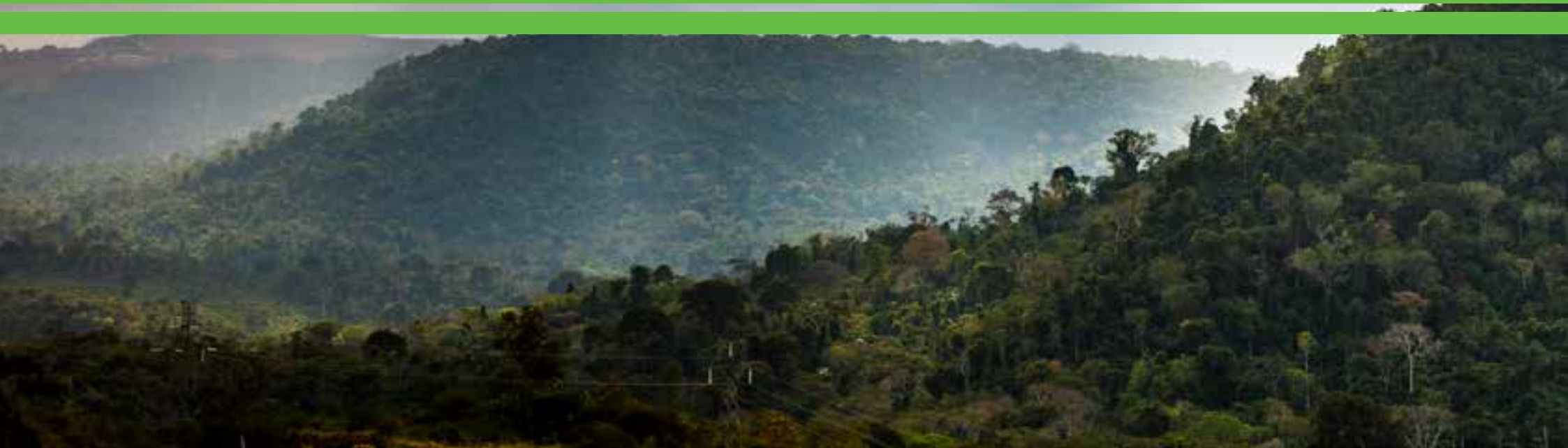
Other initiatives for internal management include the Sustainability Standards, with guidelines for the duties of leaders, and the Guide to Social Performance, with a chapter on Managing Relationships with Indigenous People and Traditional Communities. The guide has recommendations for professionals responsible for the relationship at each step of the interaction, from the phases of dialogue and preparation of preliminary studies to the mitigation actions of impacts and relationships focused on the ethno development of these populations.

The Vale maintains a broad, permanent and structured dialogue with traditional communities and indigenous peoples close to operations and projects.

In 2016, 100% of employees and contractors that interface with indigenous peoples were trained and made aware on respect and good coexistence



Environmental Responsibility



145

the number of dams maintained by Vale
in the Ferrous Metals business duly registered
with the National Department of Mineral
Production (DNPM)

See below, and in the Business Vision pillar, the commitments of the recently-revised Sustainability Policy, as well as the corresponding Sustainable Development Goals (SDGs), which are covered in the issues addressed in these pillar. This policy guides the general principles of Vale's and at this report are illustrated some examples related to the respective themes. View the Policy in its entirety at www.vale.com.

Relation to the Sustainability Policy

Vale will work contributing to the discussion and confrontation of the challenges in terms of sustainable development that are shared across various regions and countries where we are present. Our main commitments are:

- To promote complete transparency in terms of governance, policy, procedures, practices and the Vale's performance to our global stakeholders;
- To pursue opportunities that contribute to global targets' achievements related to our business, by seeking partnerships, solutions and technology for challenges to sustainable development;
- To work harmoniously with our stakeholders in order to contribute to the construction of a positive legacy for future generations, balancing the social, environmental and economic aspects of our business, and
- To monitor and anticipate trends in global themes of sustainability by developing, adopting, sharing and promoting insights of best practices, so as to continuously improve our performance.

Relation to SDGs



Waste and tailings management

Dam Management

The main objectives of ore beneficiation process are the comminution of ore, the elimination of minerals with no economic value, and compliance with quality standards required by the market. The type of beneficiation, however, is directly associated with the characteristics of the mine being explored.

Some ores are processed with natural moisture, requiring only the steps of crushing, sifting and classification to achieve target specifications, without generating tailings, as the extracted ore becomes the product. Other types, however, need to be concentrated through moisture, generating tailings – which must be adequately disposed.

In relation to Copper and Nickel ores, the final objective is to obtain concentrate with high contents of contained copper and an alloy of ferro-nickel, respectively. Copper residues present in their composition dissolved and suspended particles, which require a suitable disposal process for the proper protection of the water table; nickel tailings are already stockpiled in view of their solid nature.

In general, the tailings are carried out in dams – structures that basically consist of a barrier (solid) and reservoir to contain solid and liquid waste. The barrier, which can be built using compacted soil (conventional clay), course stones (stonefill) or tailings, is equipped with internal drainage systems for the flow of waters that percolate through this massif.

Tailings dams are commonly constructed in stages, beginning with a massif or coffer dam, in a conventional disposal area, and raised according to the needs of the operation, by means of successive heightening until it reaches its final dimension. The heightening can be achieved using three methods of construction – upstream, downstream, and center line. In the case of Base Metals Atlantic South and Vale New Caledonia, the dams are constructed by downstream methods and not by upstream methods or with tailings.

Vale follows the guidelines of renowned international organizations, such as the International Commission on Large Dams, to ensure technical and environmental sound management

84%

of dams in the
Ferrous Metals
business are built
in a single step

At Vale, dam safety
management is
carried out by
dedicated and
qualified teams

81%

of Ferrous Metals
dam reservoirs are
considered small

For the development of dam or heightening projects, Vale uses as reference the project guidelines from renowned international organizations, such as the International Commission on Large Dams (ICOLD), and NBR standard No. 13,028/2006, which is under review by the Brazilian Technical Standards Association (ABNT) and subject to public consultation among the technical community and society.

Vale also uses dams for water reservation and sediment containment. Thus, unlike tailings dams, they are usually constructed in a single step and always conventionally, with a compacted landfill.

In the iron ore business, Vale owns 145 dams, duly registered with the National Department of Mineral Production (DNPM) and the State Environment Foundation of Minas Gerais (FEAM), of which 84% are constructed in a single step and/or heightened using the downstream method. Regarding the size of the reservoirs of these structures, 81% are considered small, 13% are medium, and only 6% are considered large. Among small dams, 75% have reservoirs with volumes of less than 500,000 m³. As in other iron ore tailings dams, the material contained in the reservoirs is composed mostly of silica (sand). Silica does not contain harmful chemicals.

In relation to the Base Metals business, Vale in Brazil has 06 dams duly registered in the National Department of Mineral Production (DNPM), of which 50% are built in a single stage of elevation. Regarding the size of the reservoirs of these structures, four are considered small and two are large.



At Vale, dedicated and qualified teams are assigned the responsibility of dam safety management. Vale aims to operate its dams using advanced engineering techniques, following strict controls, monitoring their performances in a systemic way, and evaluating safety conditions through annual external audits.

At the federal level, Vale's management of dams in Brazil complies with Law No. 12,334/2010, which establishes the National Policy on Dam Safety, and two ordinances of the National Department of Mineral Production (DNPM). Ordinance No. 416/2012 establishes the National Register of Mining Dams and regulates the Mining Dams Safety Plan (PSB) and on the submission of the statement of dam stability conditions. Ordinance No. 526/2013 establishes conditions for the submission of the Mining Dam Emergency Action Plan (PAEBM).

In late 2016, the DNPM opened the draft amendments of DNPM Ordinances Nos. 416/2012 and 526/2013 to public consultation on their website.

In the State of Minas Gerais, State Council of Environmental Policy (COPAM) Normative Resolutions Nos. 62/2002 and 87/2005, supplemented by No. 124/2008, determine the

For all of the recommendations pointed out in audits, Vale prepares an Action Plan that is internally monitored by the auditors

execution of regular external audits. In 2016, 145 dams were audited in the ferrous metals area, and the respective statements of stability conditions were filed within the deadline, in order to meet Vale's safety management requirements and legal parameters, including the new Joint Resolution SEMAD/FEAM No. 2,372/2016 (Secretary of State for Environment and Sustainable Development (SEMAD) and the State Foundation for the Environment (FEAM)). This Resolution establishes guidelines for conducting Extraordinary Tailings Dam Safety Technical Audits with upstream heightening, and Decree No. 46,993/2016, which deals with the issuance of a corresponding statement of stability conditions.



6

the number of dams in the South Atlantic Basic Metals business. All of them were audited in 2016

145

the number of dams in the Ferrous Metals area that were audited during the period, with statements of stability conditions protocolled

In 2016, all six dams of the Atlântico Sul Base Metals business were audited and the respective stability condition declarations filed within the requested deadline, in accordance with Vale's safety management requirements and legal parameters.

As a result of the 151 audits, programmatic or corrective and/or preventive maintenance actions were recommended. As a result of the recommendations, several Action Plans were prepared, filed with the state environmental agency and DNPM, which are duly followed up by Vale managers and auditors.

The structures undergo visual inspections and are monitored by instruments that provide information on their structural behavior. The visual inspections are performed fortnightly and include a detailed checklist that allows for evaluating the conditions and changes in the structure.

The information gathered in inspections and in data obtained through monitoring instruments installed in the dams is recorded in auditable systems and analyzed by geotechnical engineers, who periodically evaluate if the conditions raised in the field and the readings from instruments are in accordance with the normal operating conditions of the structures.

In addition to inspection and monitoring routines, they undergo periodic maintenance, such as the cleaning of drainage and overflow structures, weeding, recovery of small erosions, restoration of slope coverage, among others, in order to ensure adequate conservation conditions for good performance. At Vale, all dams, even if no longer in operation, remain under its responsibility and are monitored, audited, and maintained normally under the same criteria and safety levels adopted during their operation.

Under the process of continuous improvement, the Emergency Response Plans for Dams (PAEBMs, in portuguese), for Vale's iron ore dams, were revisited in 2016, followed by various discussions with communities located in the vicinity of the dams, with state and municipal Civil Defense, and with regulatory agencies.

Initially, Vale updated the PAEBMs of their 50 dams classified as High Potential Associated Damage (DPA) (DNPM Ordinance No. 416/2012), focusing on the processes of emergency communication and on the study of scenarios including flood zones. Continuing the process of continuous improvement and operationalization and implementation of the emergency management of dams, the Vale has been conducting activities with communities located in the Self-rescue Zone (ZAS) and conducting a process aiming to implement a mass communication systems, also in the ZAS, downstream of each one of its structures.

Regarding governance, in 2016, a unified database was set up to manage the portfolio of Vale's iron ore dams. Named Geotechnical Risk Management (GRG, in portuguese), the system allows for the registration of any structure, documentation, projects, studies, inspection files, internal and external audit reports, and technical information, aiming to ensure that the Dam Safety Plan is up to date. A specific module of the system was also developed to generate data on iron ore dams that will constitute the Annual Mining Report (RAL), available in 2017. Thus, the GRG aims to continually improve reliability, speed, and visibility in access to information related to the structures and the management of iron ore dams.

Purpose	Total structures	Heightening Methods		
		Downstream and Conventional	Center Line	Upstream
Disposal of Tailings	60	38	6	16
Sediments Containment	74	73	0	1
Water Reservation	17	16	1	0
Total	151	127	7	17

For the management of Vale's iron ore dams portfolio, a unified database was set up during the year

Mineral Waste

Vale manages mineral waste from production processes in a way intended to reflect the Company's commitment to socio-environmental issues. The materials are distributed among the dams (tailings and sediment) and piles (overburden and tailings), and their volume varies due to production and the geological characteristics of the mine.

Mining and metallurgical waste generation was 753 million metric tons in 2014, 728 million metric tons in 2015, and 771 million metric tons last year, whereas for 2016 this mass is subdivided in 235 million metric tons of overburden and 93 million metric tons of tailings – both of iron ore – in addition to 443 million tons related to other business¹.

In the 2016 strategic planning cycle, Vale proposed a new guideline to maximize iron ore production with natural moisture, reducing tailings generation, optimizing material disposal, separating the slurry from thick tailings and using pits to dispose of the slurry.

¹. Includes overburden and tailings from the mining of nickel, potassium, manganese, coal, e copper, and slag (manganese alloy), and fertilizer byproducts.

This new plan estimates a 600 million metric-ton reduction of generated iron ore tailings by 2030, which means a 32% reduction compared to previous production plans. In 2016, the iron ore production was 60% moist beneficiation and 40% with natural moisture. The beneficiation process is expected to be reversed in the coming years, and may reach 70% beneficiation with natural moisture.

Vale also implemented a pilot project on an industrial scale with the sole objective of studying and developing new tailings disposal technologies, aimed at seeking disposal alternatives beyond dams or drainage piles.

This strategy consolidates Vale's commitment to achieving sustainable results for its operations. **MM3**

New applications and uses for mining tailings

With an eye on the future of Mining, Vale seeks ways to minimize the generation of tailings through the optimization and development of its processes, as well as evaluating new niches and industries in which its tailings could be used.

Among the studied opportunities, one of the applications is to reuse the coarse iron ore tailings in the various layers of road pavements, including the asphalt surface. Vale is conducting detailed studies in partnership with universities and companies to evaluate the technical feasibility and compliance with pavement standards.

Another initiative underway is the use of silica-rich tailings as a substitute for primary quartz in engineering stone. Amongst other applications, engineering stone is used for kitchen counters and bathrooms, positioning itself as an alternative to natural granite.

Since 2014, Vale has been working closely with leaders in the engineering stone manufacturing industry to develop recipes using silica-rich tailings as a substitute for primary quartz. This collaboration has already delivered products that not only meet industry standards for resistance to stain and impact, but also look great.

To learn more details of this and other mining tailings initiatives, please contact us through Contact Us, available at vale.com.

Non-mineral waste

Vale maintains a program for the management of its residues aiming to reduce, segregate, trace, evaluate, and proper dispose, as well as fostering job creation and income generation from recycling practices.

With the standardization brought by the review in the corporate normative waste management procedure in Brazil, the Vale has promoted improvements in the control processes of the various stages of management, including inventory and compatibility of nomenclatures in its management software.

As a form of controlling disposal, activities were maintained in the scope of the Audit Programs of waste recipients, in which all companies that receive waste from Vale Brasil undergo a process of environmental evaluation and audit. In 2016, 138 audits were conducted, out of 328 registered companies.

The internal waste management program contains waste reduction and disposal indicators and targets that include composting, reuse, re-refining, and recycling, valuing the use and seeking to reduce disposal in landfills. During 2016, for example, 157.5 tons of residues were sent to recycling co-operatives in the states of Minas Gerais and Espírito Santo, encouraging the generation of jobs in the recycling chain, in Vale's operational region.

Operations of the period resulted in 910,000 tons of residue generated, 96% non-hazardous and 4% hazardous. The principal waste generation business areas were nickel (28%) and fertilizer (36%). This volume is about 7% lower than in 2015.



96%

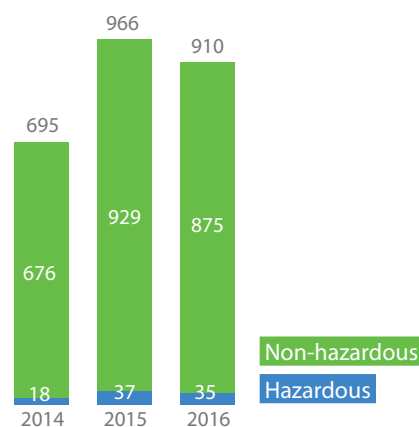
of the 910,000 metric tons of waste generated during the year were classified as non-hazardous material

The decrease in the generation of non-hazardous waste was also 7%, in the same period. The main activities that led to a reduction are concentrated at Sudbury (nickel) units at Canada, and the demobilization of Moatize (coal) Expansion project, at Mozambique. Regarding hazardous waste, there was a 6% decrease compared to the previous year.

Regarding waste disposal, 33.1% was disposed in landfills and 65.2% was sent to recycling processes, as graphic at the next page. The highlight of the year was the adoption of the Metal Scrap Valuation Program in units in Brazil, which significantly increased recycling in steel mills. [G4-EN23](#)

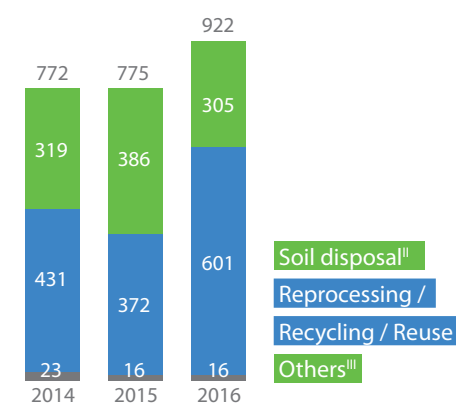
Consolidated amount of generated waste [G4-EN23](#)

In thousand metric tons



Disposal and destination^I [G4-EN23](#)

In thousand metric tons



I. In 2016, we had the inclusion of reports from the S11D Project, Serra Leste, Long Harbour, Malaysia, and Thompson (monthly). Differences between the amount of waste generated and the amount of final disposal are due to temporary storage.

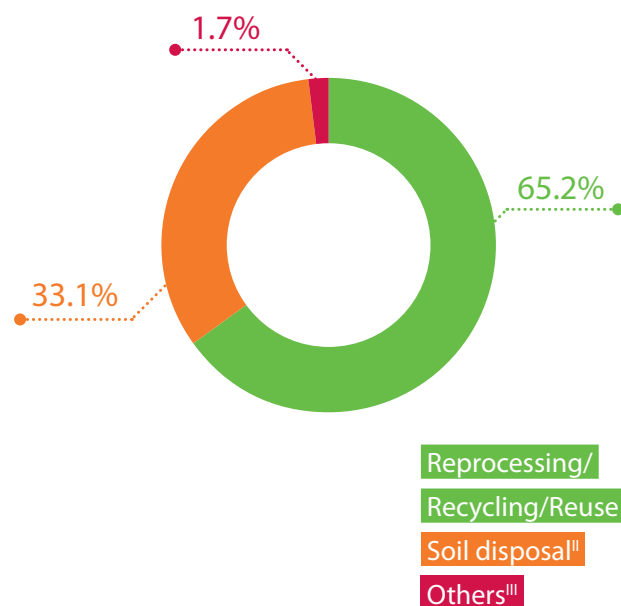
II. External sanitary landfill, internal landfill, disposition in overburden pile and subsoil.

III. Co-processing, incineration and biological treatment.

In the year, 65.2% of the waste was sent to the recycling process, which includes the scrap metal Valuation Program

Waste disposal and destination^I **G4-EN23**

Total of 922 thousand metric tons



I. In 2016, we had the inclusion of reports from the S11D Project, Serra Leste, Long Harbour, Malaysia, and Thompson (monthly).

II. External sanitary landfill, internal landfill, disposition in overburden pile and subsoil.

III. Co-processing, incineration and biological treatment.

International transport of hazardous waste

The transport of hazardous waste across borders, originating at Vale's units, is regulated by the Basel Convention. This document establishes international mechanisms of movements control based on the principle of prior and explicit consent for import, export and transit of such residues.

In 2016, on the international front, cross-border transport of hazardous waste only took place at the operational unit in New Caledonia. As being a relatively small island, New Caledonia does not have a centre for the treatment of hazardous waste. As a consequence, a total of 548 tons of hazardous waste were transported, principally to Australia and New Zealand, in accordance with agreements signed between those parties. **G4-EN25**

Significant spills

In 2016, within the scope of the Management of Significant Spills², the process for the internal sharing information about environmental incidents was strengthened, aiming to increase the knowledge base and transparency between the areas and seeking to improve risk analysis. Nevertheless, there were three occurrences that were considered critical, two of which involved dangerous products.

The spills were communicated to the responsible environmental agencies, in accordance with its emergency response plans defined. The operations involved took measures aiming to minimize impacts, analyze the incidents and adopt actions aiming to recurrences. **G4-EN24**

2. A significant spill corresponds to a critical or catastrophic incident, i.e., one that exceeds the limits of the operational unit's property and causes a significant environmental impact.

33

number of operating
units comprehended
by the Biodiversity
Risk Assessment

S11D

the project received
the implementation of
the Impact Mitigation
Hierarchy pilot project
in the year

42%

total of operations that, by
the end of 2016, required
biodiversity plans, of which
95% were already applied

Biodiversity

Our biodiversity strategy is in line with our internal Sustainability Policy, seeking to mitigate the impacts of land use, recovering and conserving territories in the regions where Vale's operate. For this, Vale takes into account relevant ecosystem services³ associated with water, climate change, energy and community, and regional characteristics. The long-term idea is to seek a net positive impact.

In 2016, we maintained our engagement in discussions and initiatives related to this context, particularly in the framework of the Brazilian Business Council on Sustainable Development (CEBDS), in which we hold the presidency of the Thematic Chamber on Biodiversity and Biotechnology.

3. Functions and processes performed by ecosystems and their species that allow for the maintenance of living conditions on the planet, including the provision of resources (food, water, wood, and fibers), support services (soil formation, photosynthesis, and nutrient cycling), and regulation services (associated with climate, flood control, infectious disease and plague control, and the maintenance of water and air quality).

Management

For the operational units where it is identified the need to have a biodiversity management plans, such plans are developed in all stages of a venture's life cycle. They include actions aiming to prevent, control, mitigate and compensate of the impacts of activities, including mandatory and voluntary ones. By the end of 2016, 42% of Vale's total operations required biodiversity plans. Of these, 95% were applied and only 5% were in the scoping or detail definition phase. Additionally, we adopted certain initiatives for the environmental recovery and maintenance of protected areas. [MM2](#)

In the end of 2015 Vale concluded the Biodiversity Risk Assessment, which covered 33 operational units, resulting in operations and projects classified as high and very high risk. From this classification, Vale seeks to make improvements to the biodiversity management plans. In addition, seeking the neutral or positive net balance of impacts, in 2016 was applied the Impact Mitigation and Hierarchy pilot project, implemented in the Carajás Iron Project S11D. The objective of this work was to organize the actions related to the management of impacts on biodiversity generated by the project activities, to prepare the balance sheet and to base adjustments and potential future improvements of the local biodiversity management plan.



In that way, the Company seeks to minimize certain restrictions and limitations to the performance of the activities, such as:

- Restriction on project implementation;
- Reduction of exploration areas;
- Excessive delay in licensing processes;
- Disproportionate costs;
- Low performance in sustainability indicators

The operational areas occupy 1.6 thousand square kilometers, of which 62% are dedicated to mineral extraction, industrial production, beneficiation, and transportation of products, and 38% are for industrial plantations. Compared to 2015, there was an addition of 22.8 square kilometers due to the planned expansion of the operations. This amount does not include operations in Australia due to divestments of assets throughout the year.

Of the operations, 61% are inserted in areas classified as wilderness areas and 28% are in so-called hotspots, and distributed in 12 ecoregions.

Taking all the location compared to protected area or to high incidence area to biodiversity (wilderness areas and hotspots)⁴ located outside protected areas, the amount of operational areas is distributed as follow⁵:

- 14.3% or 214.5 km² in areas with a high incidence of biodiversity, outside protected areas;
- 12.7% or 190.7 km² adjacent to areas with a high incidence of biodiversity;
- 31.0% or 463.7 km² close to legally protected areas;
- 13.0% or 194.0 km² in areas legally protected (conservation units) [G4-EN11](#)

At the local level, the main identified risks and impacts, direct and indirect, associated with the Vale's operations – mainly the process of suppressing vegetation which may be necessary during the installation phases or in the development of operational activities – are associated with changes in components of the physical environment that support the biotic environment (flora and fauna), and can change the biodiversity and ecosystem services. [G4-EN12](#)

In 2016, 1,824 plant species and 1,443 animal species were identified in the Vale's operational areas, of which approximately 3.1% are on the Red List of the International Union for the Conservation of Nature (IUCN), and 1.4% is on the Brazilian Ministry for the Environment's official national list of endangered species. The increases in the number of plant and animal species were 16% and 23%, respectively, compared to the previous year, mainly due to the inclusion of surveys and monitoring carried out in the

4. Large geographic areas considered important for the conservation of world's flora and fauna.
5. To calculate the adjacent area was considered a buffer of 10 km, generated from the outer limits of the protected area and high biodiversity value (adjacent), and was evaluated overlapping in relation to the area of the operation. The territories related to indigenous lands were not considered in the analysis.

In Vale's operating areas, 1,824 species of vegetation and 1,443 species of animals were identified during the period



8.2 thousand

km² of natural area is protected by Vale, both on their own and through partnerships

region of the S11D Project. Thus, the numbers of species listed in the Red List and the Environment Ministry's list of endangered species increased by 1.7 and 0.7%, respectively. [G4-EN14](#)

Protected natural areas

The maintenance of protected areas is one of the initiatives continuously developed to favor environmental balance and the conservation of natural resources and ecosystem services. Both in its own areas (4.5%) and through partnerships (95.5%), Vale protects 8.2 thousand square kilometers of natural areas, which represent approximately 5 times the sum of the areas occupied by the operational units. Disregarding its industrial plantation land, this area is 8.5 times bigger. Of this extension, 92.8% are in regions classified as wilderness areas, 7% in hotspots, and 94% near operating units. Areas owned by Vale in the Quadrilátero Ferrífero (region located in the center-south of Minas Gerais state) include 21 implemented Private Natural Heritage Reserves and 15 in the study phase for creation.

Also focusing on environmental conservation and building a legacy for Amazonian populations, in 2016, the Vale Foundation activities were maintained, the Foundation is an organization that operates through partnerships with socio-environmental institutions, governments, and local communities. In the year, the activities focused on projects to strengthen socio-biodiversity and production chains that value the standing forest, with low carbon emissions. The initiatives are in line with the Vale Foundation's strategy of fostering a sustainable business environment that promotes the reduction of illegal deforestation and the improvement of local populations quality of life.

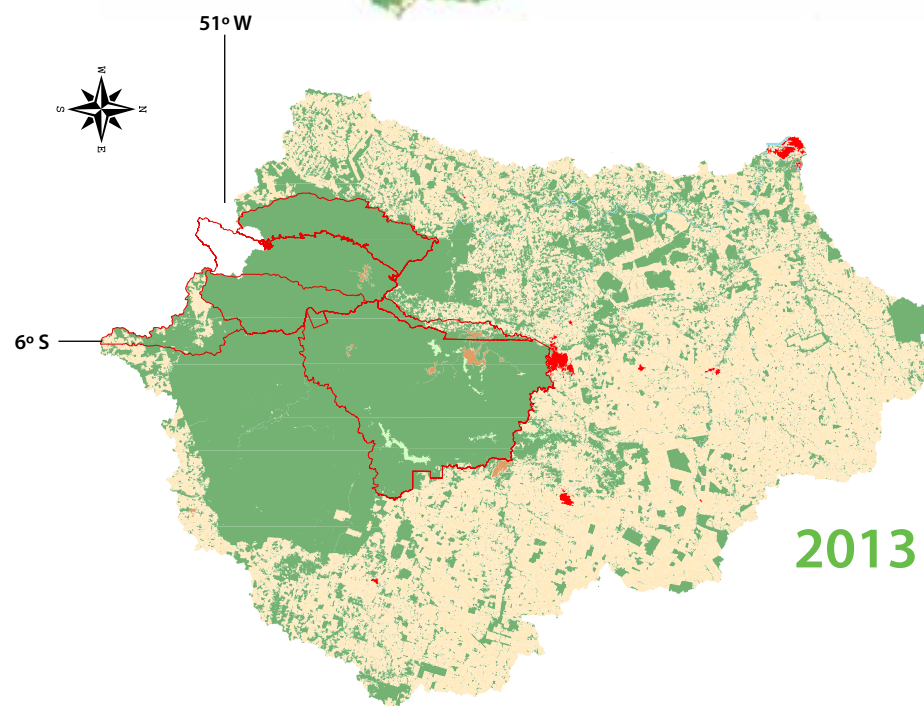
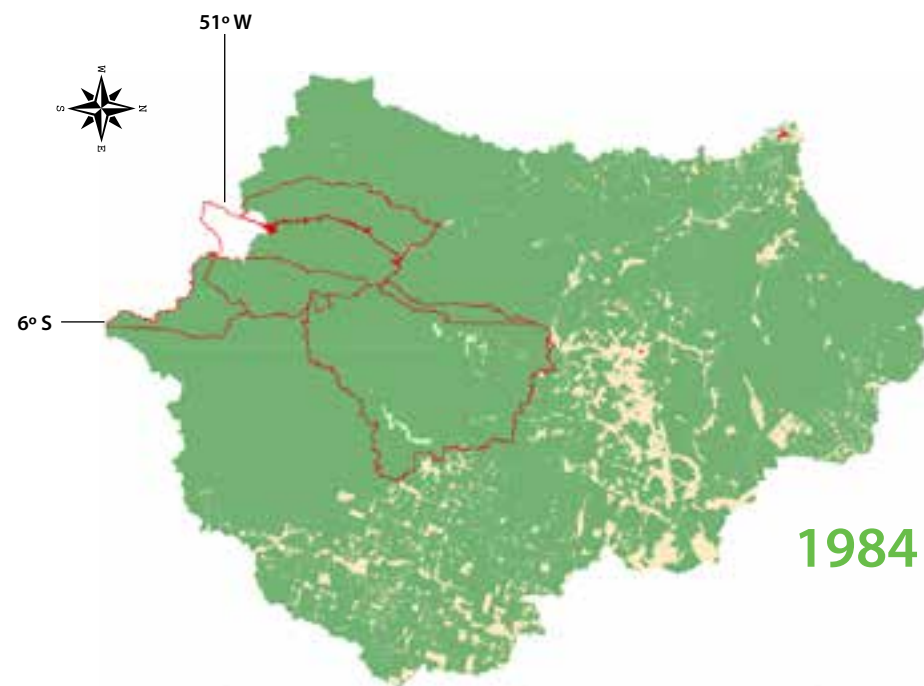
In the same sense, activities in protected areas (conservation units, agrarian reform settlements, and indigenous lands) have continued, which seek to improve territorial organization and the socio-environmental governance of the territory. An example was the attainment of 1,688 Sustainable Use Authorization Forms in southern Amazonas (Manicoré, Boca do Acre, Novo Aripuanã, and Canutama municipalities) by traditional communities, which represent 27% of the demand for this type of land regularization in the region.

The allocation of these forms is one of the most important actions of the Federal Heritage Office, because it contributes to the sustenance and acquisition of decent housing by the community, ensuring its permanence on the territories and contributing to environmental preservation. Five sustainable forest management plans were also approved, at the Forever Green Extractive Reserve in Pará, totaling 40 thousand hectares of forest managed responsibly by local communities.



Learn more at www.fundovale.org

The maps on the side show the progression of land use and change in the use in the Itacaiunas Basin, in the State of Pará, Brazil, from 1984 – when Vale began protection work in the region – to 2013. The areas of the Conservation Units mosaic (in green), the object of the work developed by ICMBio with the Vale's support, have remained preserved compared to adjacent ones. Of this entire protected area, only 2% is occupied by Vale operations.



Legend

- Bare soil/Pasture/Agriculture
- Forest
- Mining
- Montane savanna
- Outside-Basin
- Urban
- Water bodies
- Unclassified

Source: Souza-Filho PWM, de Souza EB, Silva Júnior RO et al (2016) Four decades of land-cover, land-use and hydroclimatology changes in the Itacaiúnas River watershed, southeastern Amazon. Journal of Environmental Management 167:175-184.

Recovery of Degraded Areas (RAD in Portuguese)

Recovery of Degraded Areas activities are based on compliance with technical and legal standards, and best practices in force in the regions where the Vale operates. Maintaining operations in regions with distinct socio-environmental and cultural characteristics, both in Brazil and abroad, however, requires differentiated initiatives from a methodological and temporal point of view.

The RAD process runs in parallel with operational activities and its quality and efficiency is monitored using indicators and a methodology that measure the effectiveness of the activities carried out over time.

Seeking improvement on RAD's actions, Vale maintains partnerships with different teaching and research institutions, and conducts research and development projects (R&D). In this regard, it is worth highlighting the selection studies of native plant species for use in the revegetation of mined environments, as well as to improve the applicable techniques and the development of results quality indicators. The initiatives also allow greater knowledge of the ecology of native species, which results in encouraging their adoption and building a positive legacy for the scientific communities.

In the tables in the next page are the indexes related to the areas interfered and recovered in the context of Vale Global.

Tubarão Complex, ES Floating Platforms

The extensive presence of the Broad-Snouted Caiman (*Caiman latirostris*) – once included in the list of endangered species by Brazilian Institute of the Environment and Renewable Natural Resources (Ibama) – in operational, administrative, and public use areas and railways led Vale to develop a management plan for ponds 7 and 10 of the Tubarão Complex. The goal is to ensure the integrity of the animals in green areas – equivalent to 38% of the venture – and increase the safety of workers and visitors.

Contrary to traditional practices, where the species would be transported to external areas, the project sought to maintain them in the ponds by installing five floating platforms which, after various tests, were developed with the support of the Engineering team in more adequate sizes (15.4 m²) and with light and resistant materials.

In 2016, the equipment was distributed among the ponds and, as reinforcement, 880m of chain link fencing was installed on the banks of pond 10 to prevent the access of the caimans to the visitor's area and Vale Botanical Park trails. With an adequate place to stay, the animals were discouraged from leaving the pond. So much that reports of finding the species in operational areas and cases of capture attempts were reduced.

In addition to addressing the issue of environmental education and species preservation, the project also meets a legal requirement, condition 43 of Operating License 200/2014.

Impacted and undergoing recovery areas (km ²) <u>G4-EN13</u>	2014	2015	2016
Impacted	35.8	15.6	17.3
Recovered (total)	24.4	9.7	19.4
Permanent	16.5	7.0	14.9
Temporary	7.9	2.7	4.5

Opening and closing balances (km ²) <u>MM1</u>				
Year	Impacted areas (opening balance)	Impacted areas in reference year	Permanent recovery areas in reference year	Impacted areas (closing balance)
2014	599.4	28.4	15.5	612.3
2015	612.3	15.1	6.6	620.8
2016	620.8	13.9	6.7	628.0

In 2016, Vale developed the first pilot of the Program for the Improvement of the Recovery of Degraded Areas, with five lines of action

In addition, in 2016, the first pilot program of the Recovery of Degraded Areas Improvement Program (Prorad) was developed, dedicated to part of the operating units of the Quadrilátero Ferrífero (region located in the center-south of Minas Gerais state). The initiative resulted from the joint action of the Environmental Executive Management and Instituto Tecnológico Vale (ITV) seeking improvements to RAD processes through the use of experiences and the Vale's material resources. The work resulted in the definition of five lines of activity that will be applied in 2017. The reapplication of the pilot for the Carajás region is also planned.

Caves

Through the Speleology area, Vale conducts projects and research on caves in environmental preservation and mining regions, which boosts its scientific knowledge and leads to the attainment of positive results related to the release of mining areas included in the area of influence of the caves.

In compliance with legislation, it focuses on the control and evaluation of the interference of operations on the physical and biotic characteristics of caves in iron lithology. In order to understand the process of cave formation and the maintenance of its ecological integrity and functionality, several environmental variables are prioritized.

In the biological area, the Biospeleology Program is maintained, which includes initiatives such as biotelemetry in bats, infrared spectroscopy, and DNA extraction to answer taxonomic questions on cave species. There is also the real-time monitoring of the environmental indicators of temperature and moisture.

18

number of caves with
geotechnical instruments
installed and with storage,
energy, and telemetry
stations

23

the number of
engineering
seismographs
installed into caves in
continuous rotation

53

number of native grass
species identified with
attributes for environmental
recovery

In the context of the study of the physical environment of caves, various projects were developed, among them, the Lateritas, which furthered the study of rocks where caves occur, and Geofísica Rasa, which resulted in unprecedented knowledge of the material between the ceiling and surface of the terrain, revealing features on the structural stability conditions of caves. In order to conduct this research, geotechnical and seismographic monitoring techniques adapted to the conditions of the cave environment were incorporated, with instruments that enable images to be sent in real time.

Another investment is intended for activities in automation and robotics in the scope of the Instituto Tecnológico Vale (ITV), which is testing a robot capable of inspecting cave interiors, making the job of researchers safer against conditions of ceiling instability. The idea is to advance the functionality of the robot, providing it with sensors for scientific research.

All of these actions led the Vale to end 2016 with 18 instrumented caves – 24 geotechnical instruments installed and 27 storage, energy, and telemetry stations. For the control of seismographic vibrations induced by detonations with explosives, 23 engineering seismographs are installed in caves in continuous rotation – due to mining advances in the mine. In 2017, a ground-breaking microseismic monitoring system will be implemented in cave areas of S11D and Serra Norte, in Carajás (PA). The technology is adopted worldwide in the monitoring of slopes, dams, and underground mines, and can accurately detect reactivations of structures in any part of the inside of the massif, in addition to predicting possible collapse.

Hardpans and rupestrian fields

After obtaining environmental licenses for implementing the ventures, Vale collects local plants, in accordance with the permit to suppress vegetation, cultivates them in nurseries, and replants them in locations intended for the recovery of mined territories. Whenever possible, surface soil is removed and scattered throughout the recovery area, where seedlings are introduced. Pioneering species then appear from the seeds contained in the soil, forming a vegetation cover similar to that of the area that received intervention.



Vale seeks to adopt the best practices in relation to hardpans – a type of highly resistant rock, responsible for sustaining the relief and, thus favoring surface runoff. Since 2007, Vale has invested in the study of the hardpans ecology, in order to improve projects that seek to preserve, conserve, or recover these environments. In addition to applying learning in its activities, the Vale contributes to the scientific community by sharing knowledge.

In partnership with the ITV in Belém (PA), pioneering studies were conducted on the ecological restoration of the hardpan, which included an analysis of 118 native species under three aspects: ease of management, geographical distribution, and interaction with the fauna and other ecosystem services.

Also with the ITV, Vale shares a project to identify native grasses with a potential for multiplication and use in the recovery of degraded environments. In the scope of the work, a practical guide was developed for detecting the main plants in the iron mining areas of the Environmental Protection Area of the Metropolitan Region of Belo Horizonte (APA-Sul RM BH). Criteria and potentialities related to the management, geographical distribution, and interaction with the fauna were taken into account. Thus, the species were classified, resulting in a list

of 53 varieties with a greater number of attributes. The next step is to evaluate, in a laboratory, the ability to reproduce these species – not only in soils with high iron content, such as the hardpans, but in others, without the prevalence of the mineral.

In the same vein, another project is under development in Conservation Units – Private Natural Heritage Reserves (RPPN in Portuguese). The goal is to locate populations of rare, endemic, endangered, and other species, focusing on programs for the conservation and recovery of mined areas. The work began in 2015 with the first results published in the book “On the Flora from Vale’s Private Natural Heritage Reserves: Guide to registered endangered, endemic, and rare species”. It encompasses floristic survey conducted in seven of the Vale’s RPPNs located in the Quadrilátero Ferrífero (region located in the center-south of Minas Gerais state). 1,706 botanical records (deposited in the Minas Gerais Federal University (UFMG) Herbarium) were obtained, of which approximately 84% come from Rupestrian Fields, with predominance for Quartzite Rock Fields (CRQ) (75%). In total, 59 species were considered of interest for conservation: 20 endangered, 13 almost endangered, 7 rare, 3 forbidden to cut, and 49 endemic to MG (20 from Serra do Espinhaço and 17 from the Quadrilátero Ferrífero). In addition, an undescribed species was collected.

The project under development in the RPPNs aims to locate populations of species for conservation and recovery

Continually attentive to opportunities for innovation in the conservation of biodiversity, Vale maintains the world's first Biofactory in the mineral segment specialized in the reproduction of botanical species of native flora. In these large-scale biological agent production laboratories, ideal conditions of nutrition, temperature, and luminosity are recreated in order to ensure the development of species, especially rare and endangered ones.

The Biofactory is located in the Centro de Tecnologia de Ferrosos (CTF) in Nova Lima (MG) and, since the beginning of its activities in March, 2015, 550 thousand seedlings in development from 50 species have been accounted for. The initial focus is on the reproduction of orchids, bromeliads, cacti, native grasses and trees from the region where the Vale operates, in the Quadrilátero Ferrífero (region located in the center-south of Minas Gerais state), where there is heavy presence of rocky outcrops and forests in the transition with the Atlantic Forest.

Use of Water Resources

In 2016, Vale revised its normative guidelines and directions relating to the Management of Water Resources and Effluents. For this, it took into account the alignment of concepts and the definition of basic information on the theme. It also equalized its environmental performance indicators with those of GRI, which demanded a revision of their calculation criteria. The main changes are presented in the following table.

Indicator	Previous	Current	Gains
EN8	Total water collected <ul style="list-style-type: none"> • For use in Vale's activities • For third parties • For replenishment in the environment • Effluent from another organization • Rainwater directly collected and stored by the organization 	Total water collected <ul style="list-style-type: none"> • For use in Vale's activities 	Monitor the direct interferences of the use of water collected from the environment in the Vale's production processes
EN10	Total volume and percentage of water reused <ul style="list-style-type: none"> • Recirculation • Reuse 	Total volume and percentage of water reused <ul style="list-style-type: none"> • Recirculation • Reuse • Effluent from another organization • Rainwater directly collected and stored by the organization 	Encourage the use of less noble water in production processes, reducing the collection of water from the environment

Notes: The EN22 Indicator was not changed.

The application of the concepts indicated in the table above will take effect in 2017 and the EN8 and EN10 indicators will be reported in the 2017 Sustainability Report.

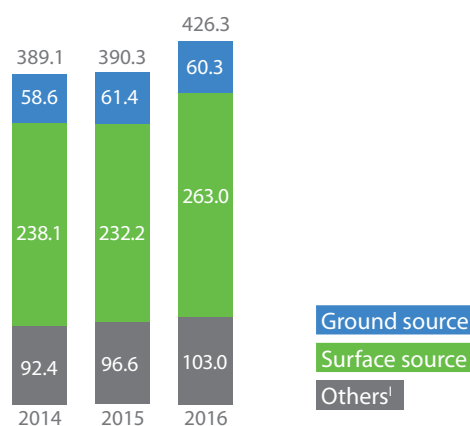
Surface and groundwater collected by the Vale are used: in its processes; made available to third parties, such as surrounding communities; in the environment, to replenish springs, for example.

In 2016, Vale collected a volume of 426 million m³ of water, of which 32 million m³ were directed use by third parties or returned to the environment for replenishing springs. In extracting this volume, the Vale used 394 million m³ for its processes. The percentage and amount of recirculated and reused water reached 80% and 1.6 billion m³, respectively, during the year, equivalent to 640 thousand olympic swimming pools. After use in industrial operations, effluents are directed to the effluent treatment facilities and discharged, totaling 195 million m³, in 2016. [G4-EN8](#) | [G4-EN10](#) | [G4-EN22](#)

In general, in the case of water collection, data is obtained by direct measurement. For some units, the data related to the release of effluents and reuse is estimated. Vale works to continuously improve measurement processes and, in this sense, for example, in 2016 it improved flow measurement systems of the Ferrous Southeast Operational Sites (Brazil).

Water by type of extraction [G4-EN8](#)

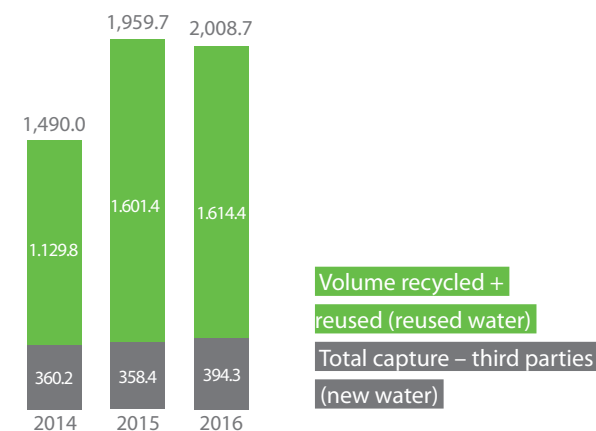
(In million m³/year)



I. Rainwater capture and water supply from other organizations to be used on Vale's processes. Rainwater captured by Vale exclusively for the use of third parties is also included in this category.

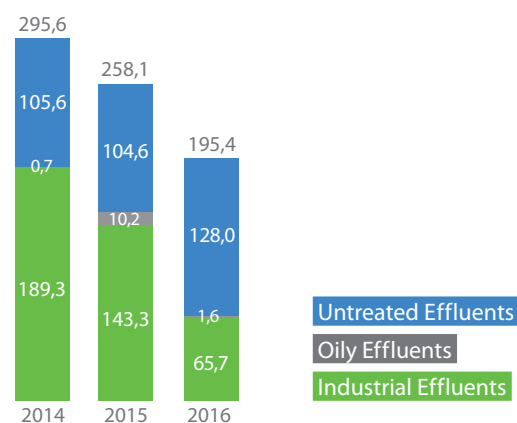
Total demand [G4-EN10](#)

(In million m³/year)



Liquid Effluents Generated by Type [G4-EN22](#)

(In million m³/year)



Another very important point for the Vale is water quality in hydrographic basins where it operates. In this context, we highlight the continuation of the Surface Water Quality Monitoring Integrated Network and Consortium project, which began in 2012 in units in Minas Gerais and was replicated in units located in the Itacaiúnas River Basin, in Pará.

Another achievement was the approval of the proposed Onça Puma Operating Vale's Units network – in the hydrographic basins of the Itacaiúnas and Xingu rivers – by the State Environment and Sustainability Office (Semas in portuguese) of Pará. The differential of the project is the integration of the monitoring of the ventures located in the same hydrographic basin. In addition to gaining synergy, which

allows for knowing the quality of the water as a whole, there is an increase in information on state monitoring programs, enabling a more effective management of the watershed.

Vale further understands that the application of the Water Footprint concept is in development, and so it participates and monitors discussions relating to the issue in forums, aimed at its future application as an indicator.

Investments in technologies and control actions that optimize, conserve, and protect the quantity and quality of water resources amounted to, in 2016, US\$156 million, which represents 28% of the Vale's total environmental expenditures (US\$562 million).

Verify below the distribution of Vale units around the world, taking into account the mapping of water stress per region, carried out by Aqueduct – World Resources Institute.

[G4-EN9](#) | [G4-EN26](#)



1.6 billion
m²

the Amount of water
that was recirculated and
reused during the year

426 million m³

the volume of water collected by Vale in the
year, of which 32 million m³ were used by third
parties or returned to nature

New water capture map by Vale's operations according to water risk areas

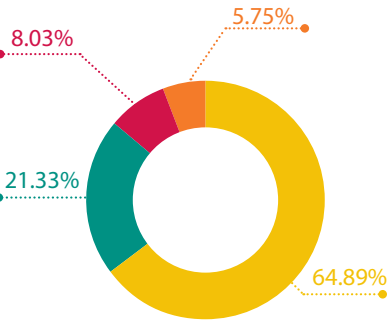
G4-EN9 | G4-EN26

● Vale's operations

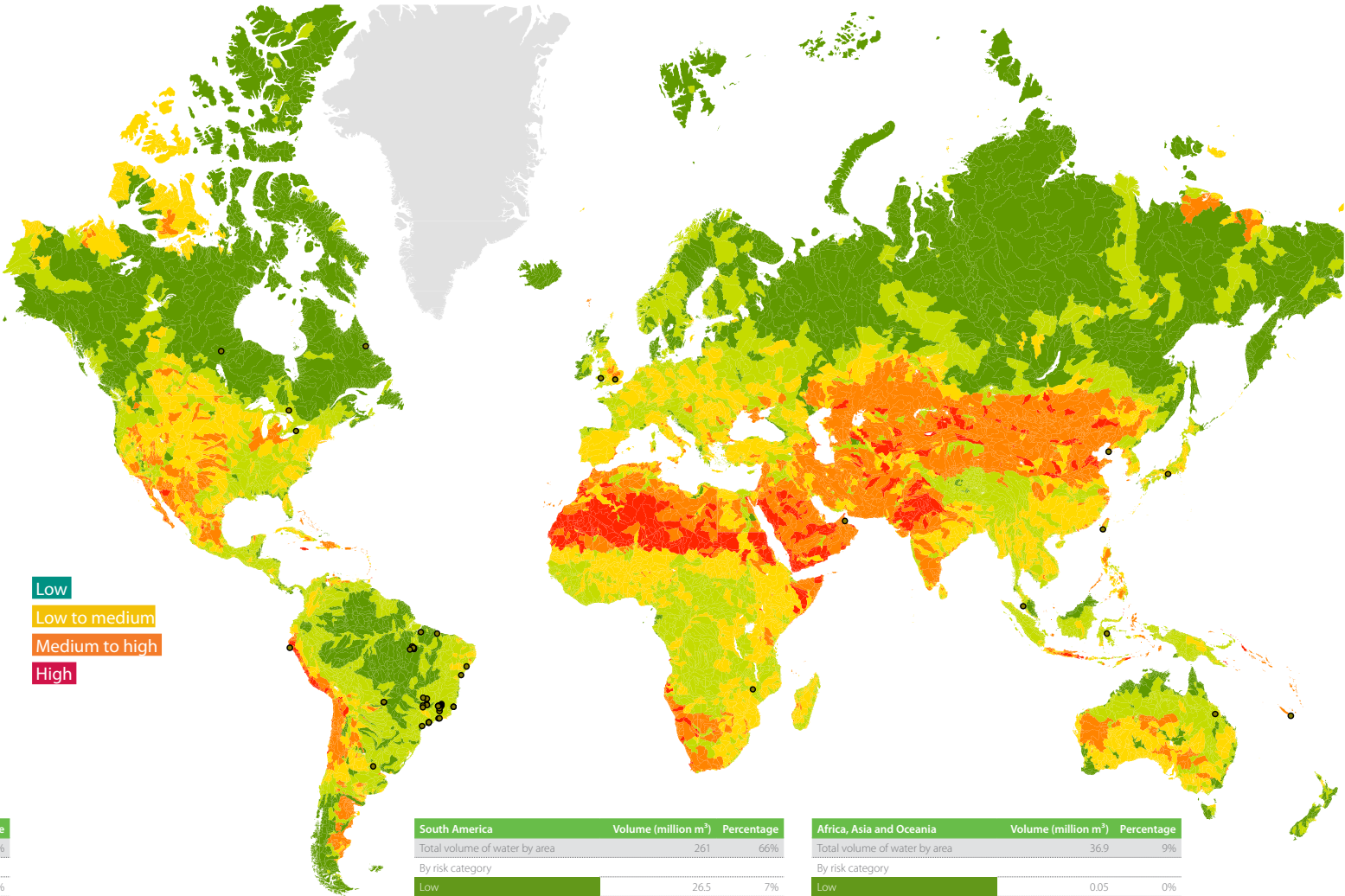
Water risk category

- No data
- Low
- Low to medium
- Medium to high
- High
- Extremely high

Distribution of total volume of water captured by area according to water risk¹



I. De acordo com Aqueduct – World Resources Institute.



North America and Europe		
Volume (million m³)	Percentage	
Total volume of water by area	96,3	24%
By risk category		
Low	57.6	15%
Low to medium	38.8	10%
Medium to high	0.02	0%
High	0.00	0%
Extremely high	0.00	0%

South America		
Volume (million m³)	Percentage	
Total volume of water by area	261	66%
By risk category		
Low	26.5	7%
Low to medium	207	52%
Medium to high	12.0	3%
High	15.9	4%
Extremely high	0.00	0%

Africa, Asia and Oceania		
Volume (million m³)	Percentage	
Total volume of water by area	36.9	9%
By risk category		
Low	0.05	0%
Low to medium	10.4	3%
Medium to high	10.66	3%
High	15.8	4%
Extremely high	0.00	0%

Use of energy resources

Internal energy consumption **G4-EN3 | G4-EN18**

Vale's energy matrix is made up of approximately 25% renewable energy and 75% non-renewable energy, of which electricity, diesel, and natural gas are the main sources consumed. In 2016, internal energy consumption totaled 193,000 TJ, and the specific emission of energy sources was 51.1 tCO₂e/TJ⁶.

There was an increase in the electricity consumption base in all of Vale's businesses in the year. Compared to base metals operations, it is worth noting the good production performance of the PTVI (Subsidiary PT Vale Indonesia TBK), an ongoing ramp-up in Long Harbour (Vale Newfoundland & Labrador Ltd), in addition to the improved performance of Sudbury (Vale Canada Limited), New Caledonia (Vale Nouvelle-Calédonie S.A.S) and Onça Puma (Vale S.A.). Regarding iron business, the highlight was the increase in consumption in the Vargem Grande II operations, improvement of Conceição I, and stabilization of Conceição II. In the Manganese business, the operation of the Barbacena unit in Minas Gerais, Brazil was resumed. In the Coal business, the Moatize II (Vale Moçambique S.A.) ramp-up justifies the increased verified consumption. In logistics, we highlight the increased consumption of electrical energy due to the regular operation of the Malaysia Terminal (Vale Malaysia Minerals).

Electricity consumption (60.9 thousand TJ) corresponds to 31.6% of the matrix. Of the total amount of electrical energy consumed by Vale, 50.3% is self-produced.

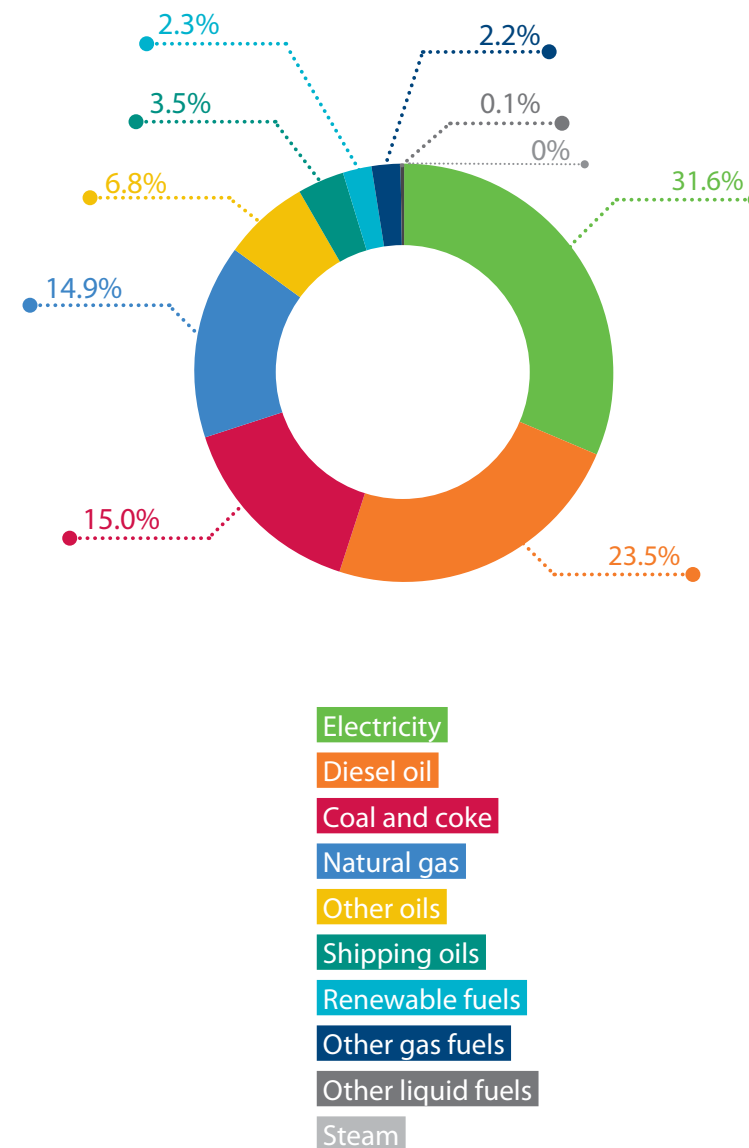
Regarding fossil fuels, the highlight were the reduced consumption of navigation oils, due to the sale of navigation operation vessels⁷, reduced consumption of fuel oil used in pellet kilns, followed by the reduction in Diesel consumption as a positive result of various initiatives for increasing the productivity of the mine's equipment fleet, and increasing the availability and reliability of the equipment in iron mines.

In logistics, we highlight the increase in fuel consumption in the Carajás Railroad due to a change in the fleet to greater availability of power and also increased speed to attend the increased flow of production. In the fertilizers business, an increased consumption of light refinery hydrocarbons (HLR) in partial replacement of natural gas was observed. The increased fuel consumption verified in the Coal business is mainly due to the ramp-up of Moatize II, as well as resumed operations in Carborough Downs, after overcoming the geological instability problems previously faced.

6. This indicator considers the direct emissions of combustion source and indirect emissions of purchased electricity over the Vale's total internal energy consumption (fuel and electricity).

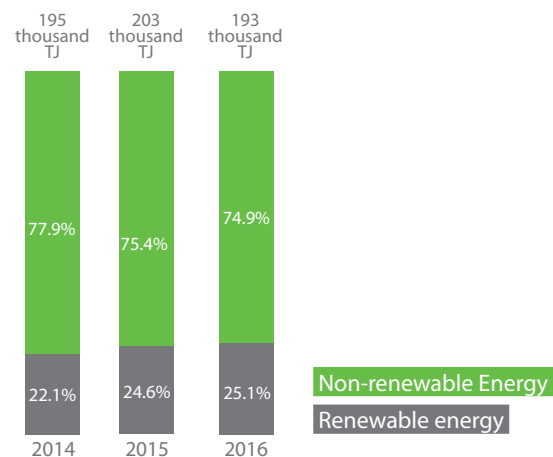
7. The consumption of shipping oils for ships sold will be incorporated into indicator G4-EN4 (energy consumption outside the organization). Emissions from this consumption are accounted in Scope 3

Energy Matrix 2016



Energy Matrix Distribution

2016 – Renewable X Non-renewable



	Thousand TJ/year	
Non-renewable fuels	66.1%	127.5
Coal and coke	15.0%	28.9
Diesel oil	23.5%	45.3
Shipping oil ^I	3.5%	6.8
Other oils ^I	6.8%	13.1
Natural gas	14.9%	28.8
Other gases ^{III}	2.2%	4.3
Other liquid fuels ^{IV}	0.1%	0.3
Renewable fuels^V	2.3%	4.5
Electricity Consumed - self production (Indonesia and Canada)	5.2%	10.1
Electricity Consumed - Purchased (GRID)		
Electricity non-renewable GRID	7.8%	15.08
Electricity renewable energy GRID	15.8%	30.4
Electricity Consumed - Purchased (OFF GRID)		
Electricity non-renewable OFF GRID	0.6%	1.2
Electricity renewable energy OFF GRID	1.8%	3.5
Energy Recovery		
Electricity – energy source NR	0.0%	
Electricity – energy source RE	0.3%	0.66
Consumed energy – renewable steam	0.0%	
Consumed energy – non-renewable steam	0.0%	0.05
Total	100.0%	192.9

I. Marine diesel, IFO, MGO, MDO.

II. Oil, BPF oil, HFO, light distillate oil, residual oil.

III. LPG, HLR, propane, gas fuel.

IV. Gasoline, methanol, kerosene and jet fuel.

V. Biodiesel, biomass, splinter, charcoal, ethanol.

In 2016, investment in renewable energy came to a total of US\$54 million, with application in the generation of hydroelectric power and energy efficiency. Vale holds direct and indirect equity stakes in nine hydro-electric power plants (HPPs) and four small hydroelectric units (SHUs) in Brazil, through its subsidiary Aliança Geração de Energia S.A. Through Aliança Norte Energia S.A., Vale also holds an indirect stake of 4.6% in Norte Energia S.A. the purpose of which is to build and operate the Belo Monte Hydroelectric Plant, in Brazil's Northern region. Overseas, Vale has three HPPs in Indonesia and five SHUs in Canada.

Vale maintains its commitment to seek supply of energy in a competitive and sustainable manner, favoring renewable sources and energy efficiency in operations, seeking to reduce costs and GHG emissions.

Energy intensity **G4-ENS**

Energy intensity indicators are monitored and used not only by business areas, but also corporately, given the internal delivery of results and the dissemination of best practices, which contributes to the promotion of continuous improvement and energy efficiency.

The majority are specific consumption indicators, that correlate energy consumption covered in the processing or movement of a given product. They are presented in different units of measure, depending on the following operations: mine, beneficiation plant, railroad, port, etc.

Savings at Vale's ports **G4-ENG**

In line with the idea of rational use of natural resources and cost reduction, the engineering project developed by Vale in the Tubarão, Ilha Guaíba (TIG), and Ponta da Madeira ports will provide annual savings of US\$429.8 million in electric energy. It allows the automatic shutdown of an engine after operating for period below pre-determined current.

With the beginning of the study and development in 2014, the system was installed as a pilot at the Tubarão and Ponta da Madeira ports, and definitively at some conveyers. On 2015, extended to five belt conveyers at the Ilha Guaíba terminal, it totaled 45 applications and not only reduced energy use at the port, but assured a new level of specific consumption (kWh/ton.), essential to sustaining the challenges of Cost and Energy Efficiency targets at Vale's ports.

The project was developed and implemented with internal resources from local maintenance and port engineering, without the need for contracts or external companies. This is an important differentiator because, in addition to being simpler and more functional, it ensures that the Vale has qualified professionals to maintain, update, and improve the system in the future.

Mitigation and adaptation to climate change

In December 2015, a new climate treaty was signed under the United Nations Framework Convention on Climate Change (UNFCCC), also known as the Paris Agreement. Ratified by more than 70 Member State, which accounted for more than 57% of emissions in October 2016, the document reached the necessary levels required for coming into force, which occurred the following month. With the goal of limiting the increase of global temperatures below 2°C compared to the pre-industrial period, and make efforts to limit it by 1.5°C, the agreement is based on individual reduction commitments undertaken by countries and must complete the breakdown compared to its adoption by 2018.

Vale follows global and regional trends in combating climate change and engages with governments, associations, academia, and civil society, directly or through forums, to assist in the management of risks associate with climate change, in accordance with its Global Policy on Mitigation and Adaptation to Climate Change.

By understanding that climate change is a challenge to be faced globally with mitigation and adaptation strategies, Vale is attentive to discussion on the pricing of Greenhouse Gas (GHG) Emissions. The Vale follows the main trends on the subject and supports national sovereignty in defining regulatory and economic instruments applicable to each country.

The global climate policy also establishes the Vale's guiding principles on the subject through ten commitments – which include a GHG reduction target, known as the Carbon Target⁸, which aims to reduce direct GHG emissions by 5% in 2020.

Vale is also committed to promoting the sustainability agenda with its suppliers through the Programa Carbono na Cadeia de Valor, in English Carbon in the Value Chain Program, and supports the research and development of new technologies to mitigate and evaluate the impact of climate change. [G4-EN19](#)

⁸ The Carbon Target, taken in 2012, considers the difference between emissions avoided or reduced with the emissions that would occur in 2020 if the Vale did not take any initiative in this direction.

Partnerships for the advancement of scientific and technological knowledge

The Research Support Foundation of Espírito Santo (Fundação de Amparo à Pesquisa e Inovação do Espírito Santo - Fapes), the Carlos Chagas Filho Research Support Foundation of the State of Rio de Janeiro (Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro - Faperj), and Vale signed a Cooperation Agreement to develop and support scientific and technological research projects. After the completion of the final stage of evaluation of the proposals, whose period of submission to the statute occurred on August 19 to December 21, 2015. In 2016, 44 research and development (R&D) projects were approved and contracted, which represent a financial contribution of approximately US\$ 4.6 million. The proportion of the investment is equal between Vale and every other party.

Among the projects approved, 11 are related to Logistics, six to Pelletizing, and 27 to the Environment, of which five are related to the subject of climate change and energy. In addition, the total includes four projects in Network (proposal involving two R&D projects, interdependent and/or complementary, one of which is from Rio de Janeiro, and the other from Espírito Santo). The research will last four years. As an example of the lines covered in the themes, energy efficiency, biomass gasification, carbon capture, and the impact of climate change on Brazilian forest species stand out.

The approved projects aim to contribute to the advancement and application of scientific and technological knowledge. The research challenges in the area of Logistics, Pelletizing, and the Environment are relevant Vale's technological and industrial development and for the accumulation of knowledge necessary for application in various fields of Brazilian society.

In addition to the Carbon Target and as a measure of financial recognition for its employees, Vale annually adopts for the operational units, in the variable remuneration program, KPIs associate with the continuous improvement of specific energy consumption indicators (fuel and electricity), which result in the improvement of GHG emissions.

Regarding public recognition for its actions on the issue of climate change, in 2016, Vale was recognized once again by the Climate Change Program of CDP⁹ as one of the leading companies in Brazil, remaining among the best scores in terms of quality and transparency in disclosing information. The Vale also maintained the Gold seal of the Brazilian GHG Protocol Program for its corporate inventory of GHG emissions¹⁰.

Risks associated with climate change

The risks related to climate change are monitored and updated every year, in accordance with the Vale's risk management methodology, and the main risks are periodically reported to senior management.

Vale has been working on its adaptation strategy since 2010, because it understands that the physical impacts of climate change can affect not only its business but its workforce, communities, and the surrounding environment, and that good risk management minimizes these impacts.

By taking measures to adapt to climate change, Vale sees the opportunity not only to improve its internal processes and protect its assets, but it can also contribute to achieving its sustainable development targets in an integrated manner. Examples in this regard are: management of natural resources, protection of biodiversity and sensitive ecosystems, as well as engagement with communities and local interest groups.

In terms of regulatory risk, the establishment of a limit to emission or carbon taxes/charges could imply additional costs to the Company. In some countries where it operates, such as in Ontario Canada, GHG emissions are priced at a certain level (federal or regional), impacting the various economic segments in a different manner. The International Maritime Organization (IMO) also studies to define a strategy on reducing emissions from trans-oceanic transportation which, depending on the proposal, may affect freight costs.

9. The CDP built the most comprehensive environmental data collection system based on reports made by companies around the world. The CDP's global disclosure system allows companies, cities, states, and regions to manage their environmental impacts, so that investors and buyers can access environmental information that can be compared and standardized to their financial decisions. Link: www.cdp.net/en-US/Pages/HomePage.aspx. The information and data submitted to the CDP program, CDP Climate Change Program, refer to the base year 2015.

10. Vale's inventory according to the operational control approach has a rolling base year and includes the gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and a group of Hydrofluorocarbons (HFC). Methodologies, guidelines, potential global warming, references and emission factors adopted in the inventory are published annually on CDP and the Public Register of Emissions of GHG Protocol Program websites.



CDP

the Organization maintains the Climate Change Program, which recognized Vale among the leading companies in the field of climate change

A change in the pattern of coal consumption – resulting from the perception that it is a high emitter – may impact the demand for the commodity in the future. Despite the fact that Vale produces coal, its focus is on metallurgical coal, which is essential in the steel industry, and for which there are no economically viable alternatives.

On the other hand, increased demand for less carbon intense products may positively impact the Company, since it has the lowest absolute total emissions and second lowest carbon intensity per unit of gross revenue among major mining companies¹¹. **G4-EC2**

GHG emissions and mitigation measures

In 2016, in Brazil, Vale began accounting for its CO₂ emissions associated with changes in land use in native areas and biogenic CO₂ removal associated with changes in land use in anthropized areas, following the guidelines of the GHG Protocol Agricultural Guidance.

In order to change the land use, the biomass above and below ground was taken into account, disregarding organic matter and harvested products. In order to estimate and monitor the forest carbon flow resulting from the change in land use, a database of environmental recovery and suppression activities was used, which are georeferenced and accounted for annually.

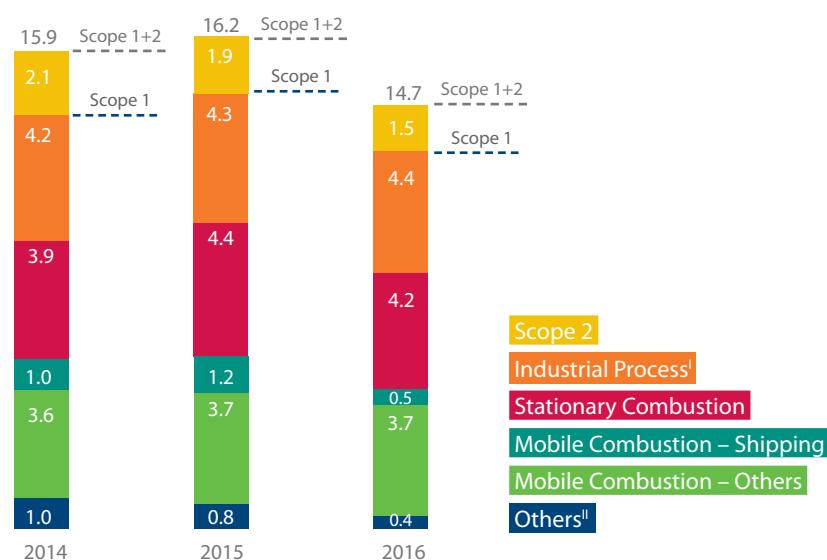
Emissions resulting from deforestation, in turn, are calculated from the classification of physiognomies affected by the overlapping polygons of these sites with the land use map made by Vale. In order to confirm the physiognomy and its degree of regeneration, an analysis of the most recent images contained in the collection of high resolution remote sensing images is performed. The carbon sequestered by vegetation growth in recovered areas is accounted for based on the type of coverage inserted and the area of coverage, only for activities aimed at ecosystem recovery, not including re-vegetated areas with grass and/or tree species. The calculations follow the IPCC methodology, making use of local factors (Tier 2) in accordance with the database of scientific study factors and Brazil's Second National Communication to the UNFCCC.

11. The data disclosed by the CDP - Climate Change Program 2016, referring to the base year of 2015, was taken into account.

In 2016, Vale emitted 13.3 million metric tons of CO₂ equivalent (tCO₂e) to direct emissions of GHGs (Scope 1), which means a reduction of approximately 7% compared to 2015

Green House Gases Emissions – Scope 1 and Scope 2

In millions metric tons of CO₂ equivalent



I. Industrial Process: emissions from the production of pellets, nickel, copper, ferroalloys, ammonia, nitric acid and the use of rock for the production of phosphate fertilizers.

II. Other: fugitive, agricultural and land use change emissions. Fugitive emissions are from the use of refrigerant gases and aerosols containing HFCs and emissions from coal mines

In 2016, Vale emitted 13.3 million metric tons of CO₂ equivalent (tCO₂e) from direct emissions of GHGs (Scope 1¹²) and 1.5 million tCO₂e from indirect emissions (Scope 2¹³). Scope 1 emissions were reduced by about 7% compared to 2015 due mainly to the sale of Carborough Downs coal assets, the continuation of the strategy for the sale of own ships and the measures to reduce fuel consumption in the ore mines of iron.

However, this reduction was not greater by accounting for land-use change (suppression in native areas), new operations at the Malaysian distribution center and the Serra Leste iron ore mine, as well as, increased nickel production in New Caledonia, the return of the Onça Puma's operation and the expansion of the Moatize coal mine in Mozambique. Scope 2 emissions were reduced by about 23% compared to the previous year, mainly due to the reduction of grid factors in Brazil and Ontario in Canada by 34% and 47%, respectively. For more information on changes to Vale's power and energy matrix, see the Use of Energy Resources section.. [G4-EN15](#) | [G4-EN16](#)

It is estimated that approximately 400.1 thousand metric tons of biogenic CO₂ was emitted, i.e., direct emissions from renewable sources of combustion (biofuels) and carbon flow resulting from the suppression and environmental recovery of anthropized areas.

In 2016, Vale continued its annual monitoring of emission reductions for the projects and initiatives that make up the Meta Carbon portfolio. As a consequence, the Vale reduced its Scope 1 emissions by approximately 776 thousand tons of CO₂e. In terms of reduction, the Vale's main initiatives are related to the elimination of GHG (N₂O abatement in the production of nitric acid), exchange of fuel (replacement of fuel oil or LPG with natural gas) and energy efficiency (as improvement of processes and reduction of average transport distance in mines). Regarding the GHG removal, in 2016, 20.8 tons of biogenic CO₂ from the atmosphere were captured, resulting from the planting of tree species.

12. They cover emissions from sources owned or controlled by Vale, such as the use of fuel and production processes.

13. They cover emissions from sources that are not owned or controlled by Vale, related to the purchase of electric energy and process steam.

Acting along the value chain

In 2016, Vale continued its Carbon Value Chain Program, which aims to encourage the management of emissions from the value chain. Last year about 50 suppliers from the State of Pará were trained to raise awareness about climate change and to encourage the quantification of GHG emissions by their suppliers. Since 2011, Vale has directly trained more than 250 suppliers and has partnered with CEBDS to train suppliers in common with the companies participating in the board.

Regarding the transmission of the results of the GHG Emission Inventory by suppliers¹⁴, since the beginning of the program in 2011 Vale already received inventories from about 300 suppliers and more than 500 companies have already participated in the Program, including training.

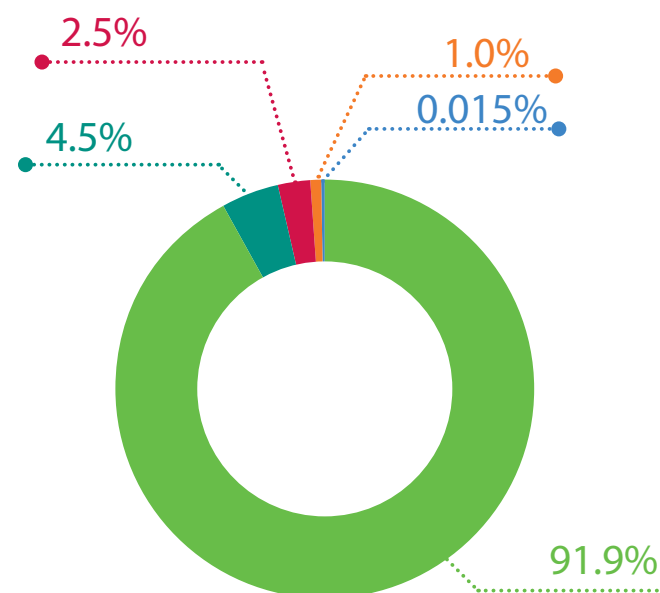
Scope 3 emissions, measured along the value chain, totaled approximately 320.6 million tCO₂e in the year, with 96.5% being related to downstream¹⁵ emissions and 3.5% to upstream¹⁶ emissions. It should be noted that the intermediate products processing category, that is, referring to the use of iron and ferroalloys sold by Vale for the production of other consumer goods, which accounted for approximately 92% of Vale's Scope 3 emissions in 2016. The graph below shows the Emissions by category of Scope 3 of Vale: [G4-EN17](#) | [G4-EN30](#)

14. Since 2012, Vale's standard contracts have a voluntary clause applicable to the categories of purchases of the most emitting materials and services (critical categories). Vale encourages the use of the clause for the other categories of purchases and services.

15. Downstream Emissions: Indirect GHG emissions related to goods and services sold.

16. Upstream Emissions: Indirect GHG emissions related to goods and services purchased or acquired.

Greenhouse gases emission – Scope 3 (million tonnes of CO₂ equivalent)



Product processing (ores and ferroalloys)

Use of Vale products^I

Transportation and distribution (upstream e downstream)

Purchase of energy, assets and services

Others^{II}

I. In the year 2016, the estimation was made only for the use of thermal coal. It was not possible account the emissions from the use of nitrogen fertilizers because of the unavailability of fertilizer sales data for the calculation of emissions. Due to Vale Fertilizantes S.A. discontinuance strategy, Vale disclosed only consolidated information on these assets.

II. Displacement of employees (home-work) (0.004%) and Air travel by employees (0.011%).

Atmospheric emissions

Vale maintained its commitment to continuously improve the management of atmospheric emissions, and has invested US\$169 million in initiatives to improve processes and adopt technologies and control systems. The amount is 28% higher than that invested in 2015.

In mining, the most significant atmospheric emissions are of particulate matter from diffuse sources (fugitive emissions), as traffic on unpaved roads, exposed areas subject to wind, handling of loose materials and rail transport.

The particulate matter from these widespread sources is monitored at points jointly defined with environmental agencies and seeks to represent the area of the operational unit and surrounding communities. However, because these defined sites are exposed to external interference, generally these results can be masked and do not reflect the actual mass of the particulate material emitted by the monitored sources.

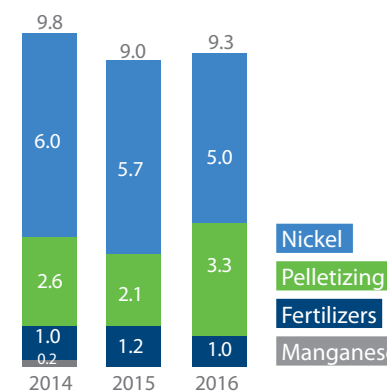
Vale seeks to reduce these widespread emissions, adopting measures such as the improvement of spray systems, testing of dust suppression products, enclosure of conveyer belts and transfer houses, wind fences¹⁷, revegetation of slopes, and the improvement of management processes. These practices permeated work on the Vitória-Minas Railroad (EFVM in portuguese) and resulted in a significant reduction in emissions of particulate material.

The project was developed based on the connection between various areas of logistics, which strived to establish a flow of monitoring and control of incidents of particulate material emissions reported by Vale professionals or third parties along the railroad. The communication process was thus optimized aiming to facilitate the analysis and solution of the problem. The most significant results were the 55% reduction of particulate emissions and also the number of recorded incidents – from 820 in 2015, to 371 in 2016.

Emissions from point sources enable the consistent monitoring of the mass of particulate matter emitted, since these facilities have chimneys that allow enable the monitoring of the gas flow and the concentration of particulate material. Thus, it is possible to verify these emissions throughout the last 3 years:

¹⁷. Wind barriers surrounding the product stockyards and reducing drag dust.

Particulate matter emissions –
Stationary Sources G4-EN21
(In thousand tons)



The Vitória-Minas Railway was the subject of a series of measures that resulted in a significant reduction in the emission of particulate matter

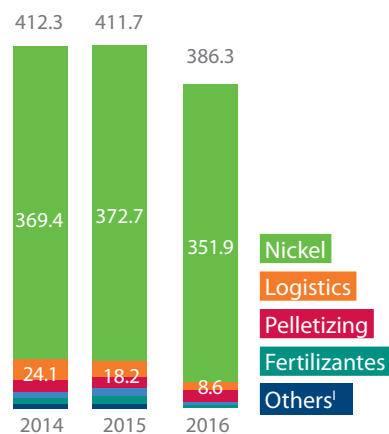
Sulphur oxides (SOx)

Emissions of sulphur oxides (SOx) are derived from some production processes and burning of fuel. Emissions from industrial processes assume that all of the sulphur added in the process and not in the products or residues is released into the atmosphere in the form of SOx. In some processes, exhaust gases were directly monitored to determine the quantity emitted. Emissions from burning of fuel are calculated from the quantities consumed and their sulphur content.

In 2016, to reduce SOx emissions, Vale aimed to prioritize low sulfur fuels and promoted improvements in operating processes and environmental control systems, contributing to the result, as shown in the following chart:

Sulphur Oxide (SOx) Emissions [G4-EN21](#)

(In thousand tons)



1. Coal, Copper, Manganese and Iron Ore.

Nitrogen oxides (NOx)

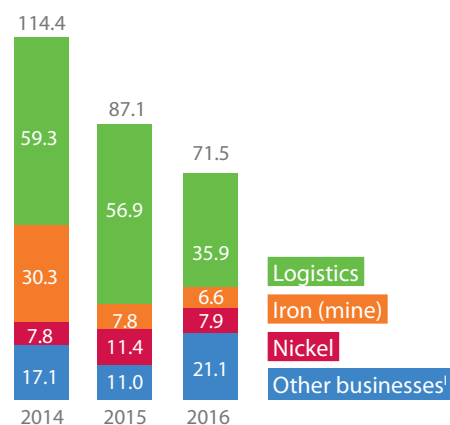
Combustion processes are the main responsible for emission of nitrogen oxides (NOx). The emissions are calculated based on specific emission factors per type of fuel and the equipment in which it is used. Some stationary emission sources had their quantities of NOx obtained through direct monitoring of the exhaust gases discharged into the atmosphere.

In 2016, there was continuity of improvement actions in the control systems and operational processes that contributed to significant reductions in the nickel operating units, responsible for the higher NOx emission volume.

The increase in NOx emissions shown in the chart below, referring to other businesses, is due to the change in concept in the calculation methodology, with the inclusion of sources previously not considered. [G4-EN21](#)

Nitrogen Oxide (NOx) Emissions [G4-EN21](#)

(In thousand tons)



1. Coal, Copper, Fertilizers, Manganese and Pelletizing.

GLOSSARY OF CONTENTS – MATERIAL THEMES

Below is a table with the material themes, the description, and related GRI aspects. It complements the material themes to further explain the contexts taken into account in the materiality process.

Theme	Coverage	GRI Aspects
BUSINESS VISION		
Ethics, integrity, and transparency in various relations	<ul style="list-style-type: none">• Clear and transparent description and disclosure of information to its various stakeholders can reflect on the credibility and good reputation of its activities, following the principles of good faith, as well as codes of ethics and standards of conduct in the dissemination of its values and principles.• Reinforcing the commitment of its employees and suppliers to prevent cases of corruption and unethical practices.	Unfair competition
		Anti-corruption
		Public policy
		Economic performance
Legal and regulatory management and global positioning	<ul style="list-style-type: none">• Management of legal and regulatory matters in order to meet and comply with domestic and international standards at all levels of Vale's operations.• Take into account the risks of changes in legislation and redefinition of global taxation.• Shared infrastructure solutions in which companies and governments share the responsibility for funding, actions, and rights of use, improving the local infrastructure and access to neighboring regions, increasing previously unfeasible economic opportunities.	Compliance (EN)
		Compliance (SO)
Business and Operational Risk Management	<ul style="list-style-type: none">• Planning for impacts in a given region in case of a sudden interruption of activities for any reason, generating loss of profit and directly impacting the end client.• Risk of interruption of operations due to strikes or accidents and disasters.	Labor relations
		Freedom of association and collective bargaining
		Human rights assessment
		Labor/Management Relations (MM)
HEALTH AND SAFETY		
Health and Safety of the workforce and community	<ul style="list-style-type: none">• Expansion and refinement of the management programs in health and safety and wellness, highlighting those that work in the operations (Vale's employees and third-party employees) and the surrounding community, including operational risk assessments and health problems caused by their activities.• Planning of actions, including emergencies, for operations in regions affected by pandemic, epidemics, or endemic diseases such as dengue, yellow fever, ebola, malaria, etc., among others that can be transmitted by workers in their global transit operations.• Prevention of physical and mental diseases in workers and the local community (such as pulmonary and tissue diseases, cancer, depression, stress, etc.) related to the exposure to hazardous substances and materials and working conditions.• Control of vehicle collisions with people and other types of accidents.• Training of personnel on related issues, organizational behaviors, and internal cultures most likely to result in serious safety incidents.	Occupational health and safety

Theme	Coverage	GRI Aspects
LOCAL DEVELOPMENT		
Environmental, social, and economic impact damage of operations on the territories	<ul style="list-style-type: none">• Management of direct impacts on the development of a region where Vale operations exist, will exist, or will no longer exist.• Inclusion of the local community in the operations, increasing the community's purchasing power and positively contributing to society – improving the region's infrastructure, providing better quality education, improving public services, and others.• Identification of social and environmental impacts that directly affect the territories, such as noise, pollution from particulate emissions, contamination of soils and rivers, temporary demographic increase, changes in traffic and routes of transportation, vehicle collisions with people, among others.• Implementing cultural heritage management plans – managing the disaggregation of communities is necessary in the interface with indigenous peoples, traditional communities, quilombolas and ribeirinhos, local communities, and other groups of stakeholders with strong cultural and local identity ties that can be designated for mining and transportation activities.	Products and services
		Indirect economic impacts
		Transport
		Overall
		Local communities
		Resettlement
		Closure planning
		Emissions
SOCIAL STRENGTHENING		
Respect for human rights	<ul style="list-style-type: none">• Preservation of decent work and protection of labor rights, focusing on the elimination of child labor and work analogous to slave labor, murders, threats, physical aggression, sexual exploitation, child prostitution, and socio-cultural discrimination.• Promotion of respect for diversity within the organization, be it gender, race, religion, socio-cultural, sexual orientation, among others, in a transversal manner for all positions within the organization.• Maintenance of open channels for complaints and accusations, guaranteeing anonymity in cases of discrimination, harassment, and mistreatment.• Consideration for the transit of migrants in regions where Vale operates, encouraging the insertion and adaptation of these new entrants into the local community, providing opportunities, cultural support, and mental and physical health.• Active participation in voluntary principles and/or global initiatives on the issue.• Management of land use conflicts and risks related to security forces.	Diversity and equal opportunity
		Equal remuneration for women and men
		Human Rights
		Non-discrimination
		Child labor
		Forced or compulsory labor
		Security practices
		Rights of Indigenous and traditional people
		Rights of Indigenous people (MM)
		Supplier human rights assessment
Community (MM)		
Dialogue and engagement with stakeholders	<ul style="list-style-type: none">• Engagement, control, and information about its impact on each group of stakeholders, not only shareholders, but also governments, labor unions, communities, civil society, employees, and others.• Exercise of the systemic vision and consideration of the impact they are having on the system as a whole, aligning investments with the long-term needs and interests of the stakeholders.• The Vale's relationship with local traditional populations, knowing and respecting all the various forms of culture and peculiarities of the community.• Maintenance of an open channel for dialogue with the various stakeholders in order to listen to the population in terms of complaints, doubts, compliments, or desires for meeting local expectations, avoiding frustrations, and minimizing conflicts between the community and the Company.	Environmental grievance mechanisms
		Human rights grievance mechanisms
		Grievance mechanisms for impacts on society
		Labor practices grievance mechanisms
Attracting, developing, and retaining professionals	<ul style="list-style-type: none">• Approach of talent retention programs made available by the company, providing assistance with scholarships for training, opportunities for expanding knowledge in other areas, salary growth from periodic performance evaluations, offer of benefits, preparation for retirement, etc., including in remote regions.• Expansion of education and sustainability awareness programs	Employment
		Training and education

Theme	Coverage	GRI Aspects
ENVIRONMENTAL RESPONSIBILITY		
Waste and tailings management	<ul style="list-style-type: none"> • Management of waste from Vale operations – mineral and non-mineral waste, etc. • Improvement of techniques to minimize waste, implementation of closed system processing that reduces water and energy consumption and the production of waste, as well as the development of tailings refining techniques that result in a benign and marketable product. • Improvement of practices for performing and monitoring dam safety. 	Efluentes and waste (MM)
		Efluentes and waste (EN)
Biodiversity	<ul style="list-style-type: none"> • Fostering of actions and programs aimed at mitigating the impacts of operations on biodiversity, going beyond environmental licensing. • Protection of areas surrounding the operations, recovery of affected areas, study of caves, study of soil use aiming at a healthy relationship with the surrounding communities with regard to the region's biodiversity. • Mitigation of loss of biodiversity and ecosystems by protecting, restoring, and promoting the sustainable use of terrestrial ecosystems, combating desertification and halting the degradation of forests. 	Biodiversity (EN)
		Biodiversity (MM)
Use of water resources	<ul style="list-style-type: none"> • Reduction of the water footprint in mining in terms of quantity and quality, through the management of the resource with respect to consumption, reuse, and the generation of effluents, increasing the local supply of water for use by the community and its supply from appropriate sources, as well as ensuring the non-pollution of water for local users. • Agreements for the prevention and remediation of erosion, sedimentation of bodies of water, and changes in water dynamics. Monitoring the scarcity and pollution of river and lakes as impacts of operations. 	Water
		Efluentes and waste
Use of energy resources	<ul style="list-style-type: none"> • Self-generation of energy, taking into account renewable sources, energy efficiency index, innovation in technologies, and emission per source (including maritime transport). 	Energy
Mitigation, adaptation, and resilience to climate change	<ul style="list-style-type: none"> • Contemplation of extreme scenarios to identify potential climate impacts on operations and local communities – from natural disasters, desertification, and floods to changes in economic living conditions – can help strengthen approaches to adaptation and emergency response plans. • Monitoring and participation in the development of international climate and energy policies to defend effective policies, taking into account existing mineral reserves and various scenarios for the management of risks, regulation, and the price of carbon in capital investment decisions. • Contemplating a departure from fossil fuels in the business model. • Contribution to debate, information, and analyses to stimulate innovation in line with the challenges of climate change, as well as the adoption of a corporate policy with the government to handle climate change and leverage efforts to speed up low-emission technologies. 	Economic performance

Independent Assurance Statement – Bureau Veritas



To Vale's stakeholders

INTRODUCTION

Bureau Veritas Certification Brazil (Bureau Veritas) was engaged by Vale S.A. (Vale), to conduct an independent assurance of its Sustainability Report for the year 2016 (hereinafter referred to as the Report).

This assessment was conducted by a multidisciplinary staff with expertise in non-financial data.

SCOPE OF WORK

The scope of this assurance encompassed the Guidelines and Principles¹ of the Global Reporting Initiative TM GRI G4 (2013) for Sustainability Reports, including the GRI Mining and Metal Sector Disclosure (2013), covering the calendar year of 2016.

VALE'S AND BUREAU VERITAS RESPONSIBILITIES

The collection, calculation and presentation of the data published in the report are Vale's management sole responsibility. Bureau Veritas is responsible for providing an independent opinion to the Stakeholders, pursuant to the scope of work defined in this statement.

METHODOLOGY

The assurance work covered the following activities:

1. Interviews with the personnel responsible for material issues and Report content;
2. Analysis of documentary evidence provided by Vale in relation to the reporting period (2016);
3. Verification of performance data relating to the principles that ensure the quality of the information, pursuant to the GRI-G4 Guideline and the Mining and Metal Sector Disclosure;
4. Review of Vale's internal systems for data aggregation;
5. Visits to the following Vale's Global Head Office (Rio de Janeiro/RJ); Carajás Complex (state of Pará); Itabirito Complex (state of Minas Gerais); Vale Fertilizantes S.A. – Cubatão Complex (states of São Paulo); Tubarão Complex (railway, port and industrial process – state of Espírito Santo); Vale Logística Argentina S.A. (San Nicolas, Argentina); and
6. Desk review of Vale's stakeholder engagement activities.

The level of verification adopted was Limited, according to the requirements of the ISAE 3000 Standard², which were incorporated to the internal assessment protocols of Bureau Veritas.

LIMITATIONS AND EXCLUSIONS

Excluded from the scope of this work was any assessment of information related to:

- Activities outside the defined reporting period;
- Statements of position (expressions of opinion, beliefs, goals, or future intentions) on the part of Vale;
- Economic and financial information contained in this Report which has been taken from financial statements verified by independent financial auditors;
- Inventory of Greenhouse Gas (GHG) emissions;
- Data and information concerning operations and activities that are not in the scope of the Report.

1. ISAE 3000: International Standard on Assurance Engagements and the GRI G4 guidelines.

2. Materiality, Stakeholder Inclusiveness, Sustainability Context, Completeness, Balance, Comparability, Accuracy, Periodicity, Clarity, and Reliability.

TECHNICAL REPORT

- Vale elaborated the Report pursuant to Guideline GRI-G4, embracing its Principles and including the Sector Supplement;
- Regarding the Report boundary, we verified that no changes occurred compared to the previous publication. Vale presents data and information referring to the companies of the group in which it has an interest of more than 50%;
- Vale made progress in the Materiality assessment in 2016, observing the GRI-G4 methodology. We verified that external experts were consulted and a panel discussion in which strategic areas of the Company took part was conducted. The directors were responsible for the final validation of the process, which resulted in nine material issues;
- The data presented to meet the GRI indicators EN3, EN4, EN16, EN17 and EN19 are part of the inventory of Greenhouse Gases Emissions (GGE), which was compiled based on the Brazilian Standard (NBR) ISO 14.064-1/07 and in the Brazilian Program - GHG Protocol. This inventory was certified in 2016 by Bureau Veritas through a separate independent assurance process. We verified that the presentation of data concerning the emissions inventory was based on the GRI-G4 methodology;
- We noticed that the controls and management of water consumption in the operational units visited were intensified. We also observed some initial efforts to calculate the water balance in the units;
- During our field visits we identified some divergence in the interpretation of the data requested concerning the selected indicators, which resulted in varying quality and basis of data reporting;
- Vale presented objective data concerning formal and safety aspects of dam structures used in the mining and support processes;

- In the course of our Assurance the inconsistencies found in the Report regarding one or more principles of the GRI-G4 and the sector supplement were satisfactorily corrected;
- Vale published data or justified the absence of data regarding the indicators associated to material aspects of the GRI-G4 and the sector supplement.

RECOMMENDATIONS

- Strengthen the qualification (training) in the operational units regarding the understanding of the data and information required through the newly implemented data collection software;
- Prioritize efforts to define concepts concerning the hydric balance of the operational units.

CONCLUSION

As a result of our assurance nothing has come to our attention that would indicate that:

- The information presented in the Report is not balanced, consistent and reliable;
- Vale has not established appropriate systems for the collection, aggregation and analysis of quantitative and qualitative data used in the Report;
- The Report does not adhere to the Principles for defining report content and quality of the GRI-G4 Guideline.

DECLARATION OF INDEPENDENCE AND IMPARTIALITY

Bureau Veritas Certification is an independent professional services firm specializing in Quality, Health, Safety, Social and Environmental Management, with more than 185 years' experience in independent assessment.

Bureau Veritas has a quality management system that is certified by a third party, according to which policies and documented procedures are maintained for the compliance with ethic, professional and legal requirements.

The assessment team has no links with Vale and the assessment is performed independently.

Bureau Veritas implemented and follows a Code of Ethics throughout its business, in order to assure that its staff preserve high ethical, integrity, objectivity, confidentiality and competence/ professional attitude standards in the performance of their activities. At the end of the assessment, a detailed report was drawn up, ensuring traceability of the process. This Report is kept as a Bureau Veritas management system record.

CONTACT

Bureau Veritas Certification is available for further clarification on www.bureauveritascertification.com.br/faleconosco.asp or by telephone (55 11) 2655-9000. São Paulo, Brazil, April 2017.



Alexander Vervuurt

Lead Auditor; Assurance Sustainability Reports (ASR)

Bureau Veritas Certification – Brazil

GRI Summary



Profile					
Strategy and analysis			Global Compact	SDG*	Pages RS
G4-1	Core	Statement from the Chairman.	-	-	18
G4-2	Comprehensive	Key impacts, risks, and opportunities.	-	-	45
Organizational profile			Global Compact	SDG	Pages RS
G4-3	Core	Name of the organization.	-	-	20
G4-4	Core	Primary products, brands and services.	-	-	20
G4-5	Core	Location of the organization's headquarters.	-	-	20
G4-6	Core	Countries where the organization has significant operations or that are specifically relevant to the sustainability topics covered in the report.	-	-	20
G4-7	Core	Nature of ownership and legal form.	-	-	20
G4-8	Core	Markets served (including geographic breakdown, sectors served, and types of customers and beneficiaries).	-	-	20
G4-9	Core	Scale of the reporting organization.	-	-	20
G4-10	Core	Workforce characteristic.	6	8	20 and 88
G4-11	Core	Percentage of total employees covered by collective bargaining agreements.	3	8	46
G4-12	Core	Description of the organization's supply chain.	-	-	88
G4-13	Core	Significant changes regarding the organization's size, structure, ownership, and its supply chain.	-	-	03
G4-14	Core	Description about whether and how the precautionary approach or principle is addressed by the organization.	-	-	44
G4-15	Core	Externally developed charters, principles, or other initiatives.	-	-	83
G4-16	Core	Participation in associations and national or international organizations.	-	-	85

Identified material aspects and boundaries			Global Compact	SDG	Pages RS
G4-17	Core	Entities included in the organization's consolidated financial statements and entities not covered by the report.	-	-	04
G4-18	Core	Process for defining the report content.	-	-	03 and 85
G4-19	Core	Material aspects identified in the process for defining report content.	-	-	03
G4-20	Core	Material aspects within the organization.	-	-	03
G4-21	Core	Material aspects outside the organization.	-	-	03
G4-22	Core	Restatements of information provided in earlier reports.	-	-	03
G4-23	Core	Significant changes from previous reporting periods in scope and aspect boundaries.	-	-	03
Stakeholder engagement			Global Compact	SDG	Pages RS
G4-24	Core	Stakeholder groups engaged by the organization.	-	-	03 and 85
G4-25	Core	Basis for identification and selection of stakeholders with whom to engage.	-	-	03 and 85
G4-26	Core	Approach and frequency of stakeholders engagement.	-	-	03 and 85
G4-27	Core	Key topics and concerns that have been raised through stakeholder engagement, by stakeholder groups.	-	-	03 and 85
Report profile			Global Compact	SDG	Pages RS
G4-28	Core	Reporting period.	-	-	03
G4-29	Core	Date of most recent previous report (if any).	-	-	03
G4-30	Core	Reporting cycle (annual, biennial).	-	-	03
G4-31	Core	Contact for questions regarding the report or its contents.	-	-	03
G4-32	Core	'In accordance' option the organization has chosen.	-	-	03
G4-33	Core	Policy and current practice with regard to seeking external assurance for the report.	-	-	03
Governance			Global Compact	SDG	Pages RS
G4-34	Core	Governance structure of the organization, including committees of the highest governance body.	-	-	22
G4-35	Comprehensive	Process for delegating economic, environmental and social topics from the highest governance body.	-	-	22
G4-36	Comprehensive	Executive-level positions with responsibility for economic, environmental and social topics.	-	-	24
G4-37	Comprehensive	Processes for consultation between stakeholders and the highest governance body on economic, environmental and social topics.	-	16	24
G4-38	Comprehensive	Profile of highest governance bodies and its committees.	-	5 and 16	23
G4-39	Comprehensive	Report whether the Chair of the highest governance body is also an executive officer (and, if so, his or her function within the organization's management and the reasons for this arrangement).	-	16	23

Governance			Global Compact	SDG	Pages RS
G4-40	Comprehensive	Nomination and selection processes for the highest governance body and its committees.	-	5 and 16	<u>23</u>
G4-41	Comprehensive	Processes for the highest governance body to ensure conflicts of interest are avoided and managed.	-	16	<u>30</u>
G4-42	Comprehensive	The highest governance body's and senior executives' roles in the development, approval, and updating of the organization's purpose, value or mission statements, strategies, policies, and goals.	-	-	<u>23</u>
G4-43	Comprehensive	Measures taken to develop and enhance the highest governance body's collective knowledge of economic, environmental and social topics.	-	4	<u>24</u>
G4-44	Comprehensive	Processes for evaluation of the highest governance body's performance with respect to economic, environmental and social topics.	-	-	<u>23</u>
G4-45	Comprehensive	The highest governance body's role in the identification and management of economic, environmental and social impacts, risks, and opportunities, and in the implementation of due diligence processes.	-	16	<u>23</u>
G4-46	Comprehensive	The highest governance body's role in reviewing the effectiveness of the organization's risk management processes for economic, environmental and social topics.	-	-	<u>23</u>
G4-47	Comprehensive	Frequency of the highest governance body's review of economic, environmental and social impacts, risks, and opportunities.	-	-	<u>23</u>
G4-48	Comprehensive	The highest committee or position that formally reviews and approves the organization's sustainability report and ensures that all material aspects are covered.	-	-	<u>24</u>
G4-49	Comprehensive	Process for communicating critical concerns to the highest governance body.	-	-	<u>24</u>
G4-50	Comprehensive	Nature and total number of critical concerns that were communicated to the highest governance body and the mechanism(s) used to address and resolve them.	-	-	<u>32 and 45</u>
G4-51	Comprehensive	Remuneration policies for the highest governance body and senior executives.	-	-	<u>23</u> – Please, check out the information in the session “Management Compensation” of 20-F Report, available at www.vale.com .
G4-52	Comprehensive	Process for determining remuneration.	-	-	<u>23</u>
G4-53	Comprehensive	How stakeholders' views are sought and taken into account regarding remuneration.	-	16	<u>23</u>
G4-54	Comprehensive	Ratio of the annual total compensation for the organization's highest-paid individual in each country of significant operations to the median annual total compensation for all employees (excluding the highest-paid individual) in the same country.	-	-	Information subject to specific confidentiality restrictions: Vale does not disclose the amounts of paid salaries.
G4-55	Comprehensive	Ratio of percentage increase in annual total compensation for the organization's highest-paid individual in each country of significant operations to the median percentage increase in annual total compensation for all employees (excluding the highest-paid individual) in the same country.	-	-	Information subject to specific confidentiality restrictions: Vale does not disclose the amounts of paid salaries.
Ethics and integrity			Global Compact	SDG	Pages RS
G4-56	Core	Organization's values, principles, standards and norms of behavior such as codes of conduct and codes of ethics.	10	16	<u>20 and 32</u>
G4-57	Comprehensive	Internal and external mechanisms for seeking advice on ethical and lawful behavior.	10	16	<u>32</u>
G4-58	Comprehensive	Internal and external mechanisms adopted by the organization for reporting concerns about unethical or unlawful behavior.	10	16	<u>32</u>

Category: Economic				
Aspect: Economic performance		Global Compact	SDG	Pages RS
DMA		-	-	<u>33</u>
G4-EC1	Direct economic value generated and distributed.	-	2, 5, 7, 8 and 9	<u>20</u>
G4-EC2	Financial implications and other risks and opportunities for the organization's activities due to climate change.	7	13	<u>136</u>
G4-EC3	Coverage of the organization's defined benefit plan obligations.	-	-	Please, check out the information in the session "Employees" of 20-F Report, available at www.vale.com .
G4-EC4	Financial assistance received from government.	-	-	Please, check out the information in the session "Tax incentives" of 20-F Report, available at www.vale.com .
Aspect: Market presence		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-EC5	Ratios of standard entry level wage by gender compared to local minimum wage at significant locations of operation.	6	1, 5 and 8	-
G4-EC6	Proportion of senior management hired from the local community at significant locations of operation.	6	8	-
Aspect: Indirect economic impacts		Global Compact	SDG	Pages RS
DMA		-	-	<u>72</u>
G4-EC7	Development and impact of infrastructure investments and services supported.	-	2, 5, 7, 9 and 11	<u>61</u> and <u>72</u>
G4-EC8	Significant indirect economic impacts, including the extent of impacts.	-	1, 2, 3, 8, 10 and 17	<u>72</u>
Aspect: Procurement practices		Global Compact	SDG	Pages RS
DMA		-	1, 5 and 8	Aspect not applicable according to the materiality.
G4-EC9	Proportion of spending on local suppliers at significant locations of operation.	-	12	-

Category: Environmental				
Aspect: Materials		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-EN1	Materials used by weight or volume.	7 and 8	8 and 12	-
G4-EN2	Percentage of materials used that are recycled input materials.	8	8 and 12	-
Aspect: Energy		Global Compact	SDG	Pages RS
DMA		-	-	131
G4-EN3	Energy consumption within the organization.	7 and 8	7, 8, 12 and 13	131
G4-EN4	Energy consumption outside of the organization.	8	7, 8, 12 and 13	The information is unavailable. There is to plan to the implementation of the collection by 2018.
G4-EN5	Energy intensity.	8	7, 8, 12 and 13	133
G4-EN6	Reduction of energy consumption.	8 and 9	7, 8, 12 and 13	133
G4-EN7	Reductions in energy requirements of products and services.	8 and 9	7, 8, 12 and 13	Indicator not applicable according to the materiality.
Aspect: Water		Global Compact	SDG	Pages RS
DMA		-	-	127
G4-EN8	Total water withdrawal by source.	7 and 8	6	128
G4-EN9	Water sources significantly affected by withdrawal of water.	8	6	129
G4-EN10	Percentage and total volume of water recycled and reused.	8	6, 8 and 12	128
Aspect: Biodiversity		Global Compact	SDG	Pages RS
DMA		-	-	119
G4-EN11	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas.	8	6, 14 and 15	120
G4-EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas.	8	6, 14 and 15	120
G4-EN13	Habitats protected or restored.	8	6, 14 and 15	122
G4-EN14	Total number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk.	8	6, 14 and 15	121

Aspect: Emissions		Global Compact	SDG	Pages RS
DMA		-	-	139
G4-EN15	Direct greenhouse gas (GHG) emissions (scope 1).	7 and 8	3, 12, 13, 14 and 15	137
G4-EN16	Energy indirect greenhouse gas (GHG) emissions (scope 2).	7 and 8	3, 12, 13, 14 and 15	137
G4-EN17	Other indirect greenhouse gas (GHG) emissions (scope 3).	7 and 8	3, 12, 13, 14 and 15	138
G4-EN18	Greenhouse gas (GHG) emissions intensity.	8 and 9	13, 14 and 15	131
G4-EN19	Reduction of greenhouse gas (GHG) emissions.	8	13, 14 and 15	134
G4-EN20	Emissions of ozone-depleting substances (ODS).	7 and 8	3 and 12	Indicator not applicable according to the materiality.
G4-EN21	NOx, SOx, and other significant air emissions.	7 and 8	13, 14 and 15	140
Aspect: Effluents and waste		Global Compact	SDG	Pages RS
DMA		-	-	110, 115, 116 and 127
G4-EN22	Total water discharge by quality and destination.	8	3, 6, 12 and 14	128
G4-EN23	Total weight of waste by type and disposal method.	8	3, 6 and 12	117 and 118
G4-EN24	Total number and volume of significant spills.	8	3, 6, 12, 14 and 15	118
G4-EN25	Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention annex I, II, III, and VIII, and percentage of transported waste shipped internationally.	8	3 and 12	118
G4-EN26	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organization's discharges of water and runoff.	8	6 and 15	129
Aspect: Products and services		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-EN27	Extent of impact mitigation of environmental impacts of products and services.	7 and 9	6, 8, 12, 13, 14 and 15	-
G4-EN28	Percentage of products sold and their packaging materials that are reclaimed by category.	8 and 9	8 and 12	-
Aspect: Compliance		Global Compact	SDG	Pages RS
DMA		-	-	38
G4-EN29	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations.	8	15	39

Aspect: Transport		Global Compact	SDG	Pages RS
DMA		-	-	<u>138</u>
G4-EN30	Significant environmental impacts of transporting products and other goods and materials for the organization's operations, and transporting members of the workforce.	8	11, 12 and 13	<u>138</u>
Aspect: Overall		Global Compact	SDG	Pages RS
DMA		-	-	<u>61</u>
G4-EN31	Total environmental protection expenditures and investments by type.	7 and 9	7, 9, 12, 13, 14, 15 and 17	<u>61</u>
Aspect: Supplier environmental assessment		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-EN32	Percentage of new suppliers that were screened using environmental criteria.	8	-	-
G4-EN33	Significant actual and potential negative environmental impacts in the supply chain and actions taken.	8	-	-
Aspect: Environmental grievance mechanisms		Global Compact	SDG	Pages RS
DMA		-	-	<u>32</u>
G4-EN34	Number of grievances about environmental impacts filed, addressed, and resolved through formal grievance mechanisms.	8	16	<u>32</u>
Category: Labor practices and decent work				
Aspect: Employment		Global Compact	SDG	Pages RS
DMA		-	-	<u>88</u>
G4-LA1	Total number and rates of new employee hires and employee turnover by age group, gender and region.	6	5 and 8	<u>90</u>
G4-LA2	Benefits provided to full-time employees that are not provided to temporary or part-time employees, by significant locations of operation.	-	8	<u>91</u>
G4-LA3	Return to work and retention rates after parental leave, by gender.	6	5 and 8	<u>91</u>
Aspect: Labor/management relations		Global Compact	SDG	Pages RS
DMA		-	-	<u>45</u>
G4-LA4	Minimum notice periods regarding operational changes, including whether these are specified in collective agreements.	3	8	<u>46</u>

Aspect: Occupational health and safety		Global Compact	SDG	Pages RS
DMA		-	-	<u>48</u>
G4-LA5	Percentage of total workforce represented in formal joint management-worker health and safety committees that help monitor and advise on occupational health and safety programs.	-	8	<u>57</u>
G4-LA6	Type of injury and rates of injury, occupational diseases, lost days, and absenteeism, and total number of work-related fatalities, by region and by gender.	-	3 and 8	<u>57</u>
G4-LA7	Workers with high incidence or high risk of diseases related to their occupation.	-	3 and 8	<u>57</u>
G4-LA8	Health and safety topics covered in formal agreements with trade unions.	-	8	<u>46</u>
Aspect: Training and education		Global Compact	SDG	Pages RS
DMA		-	-	<u>93</u>
G4-LA9	Average hours of training per year per employee by gender, and by employee category.	6	4, 5 and 8	<u>95</u>
G4-LA10	Programs for skills management and lifelong learning that support the continued employability of employees and assist them in managing career endings.	-	8	<u>95</u>
G4-LA11	Percentage of employees receiving regular performance and career development reviews, by gender and by employee category.	6	5 and 8	<u>90</u>
Aspect: Diversity and equal opportunity		Global Compact	SDG	Pages RS
DMA		-	-	<u>97</u>
G4-LA12	Composition of governance bodies and breakdown of employees per employee category according to gender, age group, minority group membership, and other indicators of diversity.	6	5 and 8	<u>99</u>
Aspect: Equal remuneration for women and men		Global Compact	SDG	Pages RS
DMA		-	-	<u>97</u>
G4-LA13	Ratio of basic salary and remuneration of women to men by employee category, by significant locations of operation.	6	5, 8 and 10	<u>99</u>
Aspect: Supplier assessment for labor practices		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-LA14	Percentage of new suppliers that were screened using labor practices criteria.	-	5, 8 and 16	-
G4-LA15	Significant actual and potential negative impacts for labor practices in the supply chain and actions taken.	-	5, 8 and 16	-

Aspect: Labor practices grievance mechanisms		Global Compact	SDG	Pages RS
DMA		-	-	32
G4-LA16	Number of grievances about labor practices filed, addressed, and resolved through formal grievance mechanisms.	-	16	32
Category: Human rights				
Aspect: Investment		Global Compact	SDG	Pages RS
DMA		-	-	101
G4-HR1	Total number and percentage of significant investment agreements and contracts that include human rights clauses or that underwent human rights screening.	2	-	101
G4-HR2	Total hours of employee training on human rights policies or procedures concerning aspects of human rights that are relevant to operations, including the percentage of employees trained.	1	-	102
Aspect: Non-discrimination		Global Compact	SDG	Pages RS
DMA		1 to 6	-	32
G4-HR3	Total number of incidents of discrimination and corrective actions taken.	6	5, 8 and 16	32
Aspect: Freedom of association and collective bargaining		Global Compact	SDG	Pages RS
DMA		-	-	45
G4-HR4	Operations and suppliers identified in which the right to exercise freedom of association and collective bargaining may be violated or at significant risk, and measures taken to support these rights.	3	8	46
Aspect: Child labor		Global Compact	SDG	Pages RS
DMA		-	-	101
G4-HR5	Operations and suppliers identified as having significant risk for incidents of child labor, and measures taken to contribute to the effective abolition of child labor.	5	8 and 16	101
Aspect: Forced or compulsory labor		Global Compact	SDG	Pages RS
DMA		-	-	101
G4-HR6	Operations and suppliers identified as having significant risk for incidents of forced or compulsory labor, and measures to contribute to the elimination of all forms of forced or compulsory labor.	4	8	101 and 103

Aspect: Security practices		Global Compact	SDG	Pages RS
DMA		1	-	102
G4-HR7	Percentage of security personnel trained in the organization's human rights policies or procedures that are relevant to operations.	1	16	102
Aspect: Indigenous rights		Global Compact	SDG	Pages RS
DMA		1	-	105
G4-HR8	Total number of incidents of violations involving rights of indigenous peoples and actions taken.	1	2	39
Aspect: Assessment		Global Compact	SDG	Pages RS
DMA		1	-	63
G4-HR9	Total number and percentage of operations that have been subject to human rights reviews or impact assessments.	1	-	64
Aspect: Supplier human rights assessment		Global Compact	SDG	Pages RS
DMA		-	-	101
G4-HR10	Percentage of new suppliers that were screened using human rights criteria.	2	-	102
G4-HR11	Significant actual and potential negative human rights impacts in the supply chain and actions taken.	2	-	102
Aspect: Human rights grievance mechanisms		Global Compact	SDG	Pages RS
DMA		1	-	32
G4-HR12	Number of grievances about human rights impacts filed, addressed, and resolved through formal grievance mechanisms.	1	16	32
Category: Society				
Aspect: Local communities		Global Compact	SDG	Pages RS
DMA		1	-	61
G4-S01	Percentage of operations with implemented local community engagement, impact assessments, and development programs.	1	-	65
G4-S02	Operations with significant actual and potential negative impacts on local communities.	1	1 and 2	64

Aspect: Anti-corruption		Global Compact	SDG	Pages RS
DMA		-	-	<u>30</u>
G4-S03	Total number and percentage of operations assessed for risks related to corruption and the significant risks identified.	10	16	<u>31</u>
G4-S04	Communication and training on anti-corruption policies and procedures.	10	16	<u>32</u>
G4-S05	Confirmed incidents of corruption and actions taken.	10	16	<u>32</u>
Aspect: Public policy		Global Compact	SDG	Pages RS
DMA		-	-	
G4-S06	Total value of political contributions by country and recipient/beneficiary.	10	16	<u>33</u>
Aspect: Anti-competitive behavior		Global Compact	SDG	Pages RS
DMA		-	-	<u>41</u>
G4-S07	Total number of legal actions for anti-competitive behavior, anti-trust, and monopoly practices and their outcomes.	-	16	<u>41</u>
Aspect: Compliance		Global Compact	SDG	Pages RS
DMA		-	-	<u>38</u>
G4-S08	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with laws and regulations.	-	16	<u>38</u>
Aspect: Supplier assessment for impacts on society		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-S09	Percentage of new suppliers that were screened using criteria for impacts on society.	-	-	-
G4-S010	Significant actual and potential negative impacts on society in the supply chain and actions taken.	-	-	-
Aspect: Grievance mechanisms for impacts on society		Global Compact	SDG	Pages RS
DMA		-	-	<u>32</u>
G4-S011	Number of grievances about impacts on society filed, addressed, and resolved through formal grievance mechanisms.	-	16	<u>32</u>

Category: Product responsibility				
Aspect: Customer health and safety		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
	Percentage of significant product and service categories for which health and safety impacts are assessed for improvement.	-	-	
G4-PR2	Total number of incidents of non-compliance with regulations and voluntary codes concerning the health and safety impacts of products and services during their life cycle, by type of outcomes.	-	15	-
Aspect: Product and service labeling		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-PR3	Type of product and service information required by the organization's procedures for product and service information and labeling, and percentage of significant product and service categories subject to such information requirements.	-	12	-
G4-PR4	Total number of incidents of non-compliance with regulations and voluntary codes concerning product and service information and labeling, by type of outcomes.	-	16	-
G4-PR5	Results of surveys measuring customer satisfaction.	-	-	
Aspect: Marketing communication		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-PR6	Sale of banned or disputed products.	-	-	-
G4-PR7	Total number of incidents of non-compliance with regulations and voluntary codes concerning marketing communications, including advertising, promotion, and sponsorship, by type of outcomes.	-	16	
Aspect: Customer privacy		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-PR8	Total number of substantiated complaints regarding breaches of customer privacy and losses of customer data.	-	16	-
Aspect: Compliance		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
G4-PR9	Monetary value of significant fines for non-compliance with laws and regulations concerning the provision and use of products and services.	-	16	-

Environmental section				
Aspect: Biodiversity		Global Compact	SDG	Pages RS
DMA		-	-	119
MM1	Amount of land (owned or leased, and managed for production activities or extractive use) disturbed or rehabilitated.	-	3, 6, 12 and 15	124
MM2	The number and percentage of total sites identified as requiring biodiversity management plans according to stated criteria, and the number (percentage) of those sites with plans in place.	-	6, 14 and 15	119
Aspects: Emissions, effluents and waste		Global Compact	SDG	Pages RS
DMA		-	-	110 , 115 , 116 , 127 and 139
MM3	Total amounts of overburden, rock, tailings, and sludges and their associated risks.	-	3, 6 and 12	115
Social section				
Labor practices and decent work performance indicators				
Aspect: Labor/Management Relations		Global Compact	SDG	Pages RS
DMA		-	-	45
MM4	Number of strikes and lock-outs exceeding one week's duration, by country.	-	8	46
Human rights performance indicators				
Aspects: Indigenous Rights		Global Compact	SDG	Pages RS
DMA		-	-	105
MM5	Total number of operations taking place in or adjacent to Indigenous Peoples' territories, and number and percentage of operations or sites where there are formal agreements with Indigenous Peoples' communities.	-	1 and 2	106

Society performance indicators				
Aspect: Community		Global Compact	SDG	Pages RS
DMA		-	-	104
MM6	Number and description of significant disputes relating to land use, customary rights of local communities and Indigenous Peoples.	-	1 and 2	105
MM7	The extent to which grievance mechanisms were used to resolve disputes relating to land use, customary rights of local communities and Indigenous Peoples, and the outcomes.	-	1 and 2	105
Aspect: Artisanal and small-scale mining		Global Compact	SDG	Pages RS
DMA		-	-	Aspect not applicable according to the materiality.
MM8	Number (and percentage) of company operating sites where artisanal and small-scale mining (ASM) takes place on, or adjacent to, the site; the associated risks and the actions taken to manage and mitigate these risks.	-	1, 2, 3, 6, 8 and 12	-
Aspect: Resettlement		Global Compact	SDG	Pages RS
DMA		-	-	74
MM9	Sites where resettlements took place, the number of households resettled in each, and how their livelihoods were affected in the process.	-	1 and 2	74
Aspect: Closure planning		Global Compact	SDG	Pages RS
DMA		-	-	76
MM10	Number and percentage of operations with closure plans.	-	-	76
Product responsibility performance indicators				
Aspecto: Gerenciamento responsável dos materiais		Global Compact	SDG	Pages RS
DMA		-	7, 8, 9, 12, 13, 14 and 17	Aspect not applicable according to the materiality.

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