

Welcome to your CDP Climate Change Questionnaire 2020

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

Vale S.A. is one of the largest metals and mining companies in the world, based on market capitalization. We are one of the leading mining companies in the global market for iron ore, iron ore pellets and nickel, with operations in more than 20 countries and five continents. The company is headquartered in Rio de Janeiro, Brazil, and has 149.3 thousand employees (71.1 thousand own and 78.2 thousand third parties), 75.6% of which are allocated in Brazil. We also produce iron ore pellets, manganese ore, ferroalloys, metallurgical and thermal coal, copper, platinum group metals (PGMs), gold, silver and cobalt. We are presently engaged in greenfield mineral exploration in five countries. In addition, we operate large logistics systems in Brazil and other regions of the world, including railroads, maritime terminals and ports, which are integrated with our mining operations. We have a distribution center to support the delivery of iron ore worldwide, directly and through affiliates and joint ventures. We also have investments in energy and steel businesses.

Vale is a publicly traded private organization. The body responsible for guiding and directing the organization's management is the Board of Directors. It is up to our Board to be the link between shareholders and leaders, to define Vale's general policies and guidelines, to evaluate plans and projects proposed by the Executive Board and to measure the results achieved. For more information, see the Governance section on the Vale ESG portal:

<http://www.vale.com/esg/pt/Paginas/Home.aspx>.

Vale's mission is to transform natural resources into prosperity and sustainable development. Vale is committed to becoming a sustainability benchmark through a comprehensive approach based on systematic planning and execution, prioritizing risk and impact management (seeking to achieve zero harm to our employees and surrounding communities) and establishing a positive social, economic and environmental legacy in the places where we operate.

Vale recognizes that climate change represents one of the greatest challenges for society and is committed to contributing to solutions that limit the increase in temperature by up to 2 ° C, as defined in the Paris Agreement. In this regard, Vale's Board of Directors updated, in 2019, the organization's carbon neutral mining strategy. Vale aims to act actively to support the decarbonization of the steel, metallurgical and shipping chains. In this context, the company's main commitment is to become carbon neutral in its operations (scopes 1 and 2) by 2050, reach 100% self-produced clean power globally, and to support these goals, we approved an internal carbon price of USD 50 / tCO₂e.

In this process, the Executive Director for Sustainability and Institutional Relations has the function of deploying and monitoring advances in the implementation of strategies and policies, in addition to being an agent of internal and external engagement, through actions and dialogue with stakeholders, as well as strengthening the relationship between Vale and society, being an

important facilitator for the implementation of the new pact with society, one of Vale's strategic pillars.

In addition, acting with transparency and taking into account the expectations of its stakeholders is one of the company's pillars. One of the transparency initiatives related to climate change in which Vale participates, is the TCFD, an initiative that aims to promote transparency regarding climate-related risks and opportunities. Since 2016, Vale, as one of the first signatory companies, has technically contributed to the construction of the TCFD Framework through the public consultation process. Some other relevant forums focused on climate change that Vale is part of are: Carbon Pricing Leadership Coalition, International Council on Mining and Metals, Task Force on Climate Related Financial Disclosures, CDP, and the WBCSD (World Business Council for Sustainable Development).

From 2018 to 2019, we would like to highlight the green technological advances that Vale has invested in, one of which being Tecnored, which uses different raw materials in its process to reduce environmental pressure.

The answers given in the CDP questionnaire refer to 100% of Vale S.A.'s operating units and to the companies over which Vale has operational control, that is, its subsidiaries in Brazil and other countries. This group of entities is called "Grupo Vale".

For additional details on our commodities, assets and regions, and to access the latest information on the topics covered in this CDP response, see our 2019 Sustainability Report, which is available online at <http://www.vale.com/brazil/PT/investors/information-market/annual-reports/sustainability-reports/Pages/default.aspx>.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years
Reporting year	janeiro 1, 2019	dezembro 31, 2019	No

C0.3

(C0.3) Select the countries/areas for which you will be supplying data.

- Brazil
- Canada
- China
- Indonesia
- Japan
- Malaysia
- Mozambique
- New Caledonia
- Oman
- Paraguay
- United Kingdom of Great Britain and Northern Ireland

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

USD

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your chosen approach for consolidating your GHG inventory.

Operational control

C-MM0.7

(C-MM0.7) Which part of the metals and mining value chain does your organization operate in?

Row 1

Mining

- Copper
- Iron ore
- Nickel
- Other non-ferrous metal mining, please specify
 - Coal
- Other mining, please specify
 - Manganese ore

Processing metals

- Copper
- Gold
- Platinum group metals
- Silver
- Nickel
- Other ferrous metals, please specify
 - Manganese Ferroalloys
- Other non-ferrous metals, please specify
 - Cobalt

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain
Chief Sustainability Officer (CSO)	<p>The Executive Director of Sustainability, Communications and Institutional Relations is a legal representative of the company responsible for day-to-day operations and the implementation of the general policies and guidelines set forth by the Board of Directors.</p> <p>The Executive Directorate for Sustainability and Institutional Relations has the function of deploying and monitoring advances in the implementation of strategies and policies, in addition to being an agent of internal and external engagement, through actions and dialogue with stakeholders, as well as strengthening the relationship between Vale and society, being an important facilitator for the implementation of the new pact with society, one of Vale's strategic pillars.</p> <p>In 2018, the aforementioned Executive Director coordinated the execution and approval of the "Vale Sustentável" (Vale Sustainable), a plan which defines sustainability ambitions for Vale for the next year, including guidelines and targets. Climate change was included in the plan, since it is considered a material issue for Vale.</p> <p>During 2019, the Executive Director was also responsible for conducting a strategic process of benchmarking and engagement that culminated with the announcement of new and more ambitious climate-related intentions, broadcasted to global investors at the 2019 Vale Day. These innovations include a target for achieving net zero emissions in scope 1 and 2 emissions by 2050, and promoting an emission reduction by 2030 compatible with the Paris Agreement.</p> <p>Also in 2019, the Executive Committee established the Low Carbon Forum with the aim to manage the implementation of the Vale Carbon Neutral strategy. The Forum is coordinated by the Executive Director of Sustainability and includes the CEO, the CFO, the COO, the Base Metals Executive Director, and the Business Support Executive Director in its monthly meetings.</p>
Board-level committee	<p>Our Board of Directors is responsible for defining Vale's general policies and guidelines - included therein that which related to the adaptation to Climate Change, as it is a strategic theme for the company - as well as evaluating plans and projects proposed by the Executive Board and assessing the results achieved compared to the short and long term targets. It is responsible as well for evaluating the Company's sustainability strategy, policies, conduct and performance regarding Sustainability indicators.</p> <p>The Sustainability Committee advises the Board on sustainability-related issues, including climate change. The Committee works continuously, not only upon demand of the Board, and follows an annual calendar. At least 2 members of the</p>

	<p>Committee must be also members of the Board.</p> <p>Among some of the attributions that belong to the Sustainability Committee, we highlight the following: assist in the definition, evaluation and monitoring of the Sustainability indicators and propose improvements (including internal climate change indicators); evaluate and propose Vale's adoption or adherence to initiatives or agreements at the national or international level related to issues of social and environmental responsibility (such as the Global Compact for climate change), as well as monitoring the preparation and dissemination of the Sustainability Report, CDP questionnaire, and GHG inventory; evaluate projects, initiatives as well as the Company's investment proposals from the perspective of sustainability (including issues of climate change) and innovation, in addition to making possible recommendations to the Board of Directors; and monitor the scope of action and effectiveness of the area of institutional relations in dealings with regulatory bodies and other institutional relations associated with sustainability issues.</p> <p>In 2019, Vale's Board of Directors, updated the Vale Carbon Neutral Strategy, including new commitments for the reduction of greenhouse gas (GHG) emissions, more ambitious than previously established in 2018, aiming to become a carbon neutral mining company by 2050.</p> <p>New targets discussed by the Sustainability Committee and approved by the Board of Directors include:</p> <ul style="list-style-type: none"> - Reduction of 33% in the absolute emission of scopes 1 and 2, in 2030, in line with the Paris Agreement. - Become carbon neutral (scope 1 and 2) by 2050.
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C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Schedule d – all meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action	The Board' Sustainability Committee internal rules, which describes its composition, responsibilities and meetings rules are described in the document available at: < http://www.vale.com/brasil/PT/investors/corporate-governance/board-committees-councils/Documents/regimento_interno_comite_de_sustentabilidade_2018.pdf >.

	<p>Reviewing and guiding annual budgets</p> <p>Reviewing and guiding business plans</p> <p>Setting performance objectives</p> <p>Monitoring implementation and performance of objectives</p> <p>Monitoring and overseeing progress against goals and targets for addressing climate-related issues</p> <p>Other, please specify</p> <p>Approve adherence to climate initiatives</p>	<p>The ordinary meetings occur as scheduled in the approved annual calendar. When necessary, extraordinarily meetings are arranged. During the meetings, the Company's sustainability strategy, policies, conduct and performance regarding Sustainability aspects (including climate change) are evaluated and improvements based on a long-term vision are proposed.</p> <p>Furthermore, the company's Sustainability indicators are evaluated and monitored. If it is necessary, improvements are proposed. In addition, all the operational risks and controls (including those related to climate change) are monitored and improvements in mitigation plans are proposed.</p>
<p>Schedule d – some meetings</p>	<p>Reviewing and guiding strategy</p> <p>Reviewing and guiding major plans of action</p> <p>Reviewing and guiding annual budgets</p>	<p>Climate change budget is annually discussed with and approved by the Executive Director of Sustainability and Institutional Relations. Climate change risks are periodically discussed with the Executive Director and with the Executive Board of Directors. Opportunities, such as changing internal energetic matrix and energy efficiency are discussed periodically as well.</p>

	Setting performance objectives Monitoring implementation and performance of objectives Monitoring and overseeing progress against goals and targets for addressing climate-related issues	
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C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Chief Sustainability Officer (CSO)	Both assessing and managing climate-related risks and opportunities	Quarterly

C1.2a

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).

The Chief Sustainability Officer (Executive director of Sustainability, Communication and Institutional Relations) is the highest-level in management position responsible for climate change. This position is below the Board of Directors, being intermediated by the CEO. The Chief Sustainability Officer is the company's legal representative and its position level has the attribution of representing the company for sustainability issues such as climate change. It is responsible for proposing climate change policies, plans, projects and targets to the approval of the Executive Board, as well as for implementing the general policies and guidelines set forth by the Board of Directors. The Chief Sustainability is also responsible for evaluating, monitoring and reporting Vale's performance, risks and opportunities regarding climate change to the Board of Directors.

Vale's mission to transform natural resources into prosperity and sustainable development is shared by all of its business areas and fronts. To this end, the company promotes management based on voluntary business actions and partnerships with different levels of government, public institutions, other companies and civil society. In this process, the Chief Sustainability Officer has the function of unfolding and monitoring progress in the execution of strategies and policies, in addition to being an agent of internal and external engagement, through actions and dialogue with stakeholders, as well as strengthening ties between Vale and society, being an important facilitator for the implementation of the new pact with society, one of Vale's strategic pillars.

Vale 's sustainability team tracks and monitors the performance of KPIs related to climate change through data available in the Credit - Credit360 system. In this tool, it is possible to find the action plan to reduce emissions of greenhouse gases, the area responsible, calculation form and performance per period. The annual budget dedicated to the topic of climate change is discussed and approved by the Chief Sustainability Officer, who is responsible for managing climate change issues within the Sustainability Board. In addition, the Chief Sustainability Officer is responsible for approving the budget, proposing policies, projects, and targets, and submitting them for approval by the Board of Directors. Upon approval, the Chief Sustainability Officer becomes responsible for monitoring and reporting on policies.

The Low Carbon Forum was also created to manage the implementation of the Vale Carbon Neutral strategy. The Forum is coordinated by the Chief Sustainability Officer with the support of the Executive Boards: Coal, Strategy and Mineral Exploration, Business Support, Ferrous, Basic Metals and with the participation of Vale's CEO. The meetings are held monthly with the participation of the broad leadership and technical teams that deal with the topic on a day-to-day basis. Vale's goal, throughout the climate change management process, is to develop a portfolio of low carbon projects made possible by the internal carbon price, in addition to a better understanding of regulatory risks and their impacts; engage the company leadership and technical teams on the relevance of the topic; better understand and communicate material risks and opportunities for climate change in business; change Vale's energy consumption matrix through higher consumption of renewable energy sources; and reduce the carbon footprint of their products.

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).

Entitled to incentive	Type of incentive	Activity incentivized	Comment
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Chief Executive Officer (CEO)	Monetary reward	Emissions reduction target	The CEO receives incentive payments insofar as Vale meets collective climate change goals and strategic results. It represents 2.25% of CEO's variable pay. The emission intensity reduction targets are monitored within the Sustainability KPI Scorecard.
All employees	Monetary reward	Emissions reduction target	The Sustainability KPI goals program encourages the continuous improvement of the company's performance on material socio-environmental issues. Environmental and social indicators work as metrics to assess the sustainability of the different business areas, reflecting on the variable remuneration of the teams. All of these goals, once defined, are registered and monitored in the Career, Succession and Performance (CSP) system. The Sustainability KPIs program integrates the variable remuneration of all Vale employees and impacts all hierarchical levels, up to the CEO. In 2019, this program continued to correspond to 10% of employees' variable remuneration.

C2. Risks and opportunities

C2.1

(C2.1) Does your organization have a process for identifying, assessing, and responding to climate-related risks and opportunities?

Yes

C2.1a

(C2.1a) How does your organization define short-, medium- and long-term time horizons?

	From (years)	To (years)	Comment
Short-term	0	3	The environment management area is responsible for the assessment of the climate change's R&O based on the business strategic planning, risk management processes, and regulation monitoring. Therefore, for strategy and climate change analysis, we consider 3 years as short-term.
Medium-term	3	10	For the climate change area, medium-term is equivalent to 10 years.
Long-term	10	30	Vale conducts a business resilience test in the various climate change scenarios for a twelve-year horizon (until 2030), with the aim of being prepared for the challenges of the transition to a low carbon world.

			Therefore, Vale considers 10 years or more as long-term.
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C2.1b

(C2.1b) How does your organization define substantive financial or strategic impact on your business?

Vale has a global corporate risk management policy for the Vale Group, which establishes guidelines for corporate risk management aiming to promote the integrated management of all risks to which Vale is exposed. The corporate risk is the integrated view of the different Risks and Opportunities (R&O) dimensions, including but not limited to: health and safety, environment (including weather-related), communities impacted by Vale operations, reputation, regulation, market, ability to generate cash flows and financial statements. At the company level, environment management area is responsible for the assessment of the climate change's R&O based on the business strategic planning, risk management processes, and regulation monitoring.

At both asset and business level, the Operational Risk area conducts risk assessments of Vale's operations through workshops in the business areas. Then, climate change R&O are identified, analysed and evaluated. Vale also maintains a network of operational areas to help in the R&O assessment. R&O is monitored by the operational risk area, including weather-related, are reviewed yearly or when there is a relevant alteration in its context.

R&O related to climate change are under the responsibility of the Sustainability Board and are identified based on strategic business planning and existing risk management processes, as well as by monitoring the regulatory environment. The R&O are periodically reported to a Risk Management Executive Committee (created by the Board of Directors) and led by the CFO. R&O are also reported quarterly to the Executive Board and disclosed in the Annual Report (Form 20-F) and Vale's Sustainability Report. The Vale Risk Management Executive Committee is responsible for supporting the Executive Board of Vale in decisions relating to risk management, issuing an opinion on risk management matters of the Vale Group. It is also responsible for monitoring and managing corporate risk and reporting periodically to the Executive Board of Vale regarding Vale's main risks and exposures. In 2018, Vale worked in conjunction with external consultants to survey and detail the impacts of climate change on the company's long-term strategy.

Vale established a methodology to prioritize risks, observing the principles and rules of the Operational Risk Management Norm. In general terms, R&O are ranked and displayed in a standard Risk Matrix considering the severity and likelihood of the impacts and, finally, evaluated, to determine if it is at an acceptable level or not, and prioritized.

For climate change physical risks, Vale developed an IPCC-based scenario of potential impacts to help operational areas prioritize risks, taking into account the uncertainty related to these impacts. The analysis included different regions of operation and evaluated the prospects for increasing average temperature and changes in hydrological patterns. For climate change regulation, Vale created a carbon pricing model that foresees possible future impact on operational cost for each Business. It includes direct costs due to carbon pricing mechanisms, considering the impact on the supply chain related to carbon pricing mechanisms. At the same time, its Institutional Relations team, coupled with the Strategic Planning, Marketing, Shipping, Market Intelligence and Climate Change teams monitor evolving climate-related regulations,

such as carbon pricing, and changing demand which could, potentially lead to a preference for low carbon products.

Vale's methodology to manage corporate risks combines information on risks' inferred frequency and severity to classify them in terms of priority. Risks are classified as high, medium or low residual risk (remaining risks after mitigation controls are implemented). High risks are those that combine high-frequency rates (monthly or annual) and high severity values (more than ten million, multiple fatalities, environmental damages, penalties, etc) depending on the combination at the risk matrix.

The severity level depends on the risk assessment scope and objectives and the level of effect (greatest level) between the various types of impacts on the environment, social, reputation, financial, etc. The likelihood of the impact is also analysed based on the historical events and experience of the employees from the respective regions and/or corporate. It is also necessary to into account the controls that are already in place or, in the case of projects, which are planned and budgeted. Considering the controls currently implemented, it is also important to check the residual risk and assess its level of acceptability, defining the needs for additional measures.

A "substantial impact" for Vale is an impact financial or non-financial that may impair our ability to achieve our strategy. Although our definition of a noun varies with time and situation, we consider a substantial financial impact to be between 5 and 10% of EBTIDA, around US \$1 billion.

C2.2

(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations
Upstream
Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

More than once a year

Time horizon(s) covered

Short-term
Medium-term
Long-term

Description of process

Direct operations
Risks and Opportunities (R&O) related to climate change are the responsibility of the Sustainability Department and are identified based on strategic business planning,

existing risk management processes and regulatory environment monitoring. These topics are periodically presented to the Risk Management Executive Committee, where they are reviewed for quarterly reporting to the Board of Directors and published in the Annual Report and the Sustainability Report. Identified risks are monitored and reviewed annually if no material change occurs during the year. In the case of risks related to climate change, Vale has developed specific analysis methodologies divided between impacts arising from Transitional risk (Regulatory changes, Legal, Technological, Market and Reputation) and Physical risk (physical Acute and physical Chronic), according to TCFD.

Vale established a methodology to prioritize risks, observing the principles and rules of the Operational Risk Management Norm. In general terms, R&O are ranked and displayed in a standard Risk Matrix considering the severity and likelihood of the impacts and, finally, evaluated, to determine if it is at an acceptable level or not, and allowed. For climate change physical risks, Vale developed an IPCC-based scenario of potential impacts to help operational areas prioritize risks, taking into account the uncertainty related to these impacts. The analysis included different regions of operation and evaluated the prospects for increasing average temperature and changes in hydrological patterns. For climate change regulation (transitional risk), Vale created a carbon pricing model that foresees possible future impact on operational cost for each Business. At the same time, its Institutional Relations team, coupled with the Strategic Planning, Marketing, Shipping, Market Intelligence and Climate Change teams monitor evolving climate-related regulations, such as carbon pricing, and changing demand which could, potentially lead to a preference for low carbon products.

Example of transitional risk: Country-specific carbon pricing policies will affect margins for intensive business. Vale recognizes the risks and opportunities imposed by carbon pricing schemes, and in order to minimize the risks and maximize opportunities, we have a Global Policy of Mitigation and Adaptation to Climate Change. This policy describes the guidelines on the subject, encompassing commitments to manage and reduce GHG emissions from the company.

Case study: A strategy to reduce the impacts of carbon taxation in Canada, for example, is the “Green Energy Vehicle Program”. Throughout 2019 and 2020 we have accepted delivery of numerous electric battery vehicles within North Atlantic’s underground operations. Key operating and performance metrics will be collected, tracked and shared throughout the trial phase to expedite the validation of this technology and to improve our internal understanding of its impacts on the business. We expect to see a decrease in diesel fuel consumption as our fleet transitions to alternative energy sources as a part of this program. By means of example, Creighton mine, is home to the largest fleet of battery electric vehicles within Vale, recognized as the GEV pilot project.

Example of a physical risk: Changes in precipitation patterns may present a risk to Vale’s operations, as heavier rainfall may cause damage to equipment and logistic assets, reducing or even disrupting production. On the other hand, the lack of water resources may jeopardize the maintenance of air quality in operations, a mandatory condition to operate. For instance, the increase in average rainfall in the northern region, namely in Porto Ponta da Madeira. There are sets of actions that are applicable to minimize these impacts, such as: use of cover in the ore storage yards, possibilities for covering wagons, rescheduling of the shipment to avoid contact of the ore with moisture.

Upstream

The process of identifying and evaluating risks and opportunity (R&O) are present in all activities, products and services of Vale and its extirpation both internally and externally. Vale established a methodology to prioritize risks, observing the principles and rules of the Operational Risk Management Norm. In general terms, R&O are ranked and displayed in a standard Risk Matrix considering the severity and likelihood of the impacts and, finally, evaluated to determine if it is at an acceptable level or not and prioritize the critical ones.

Our main Transitional risk related to Upstream are: Regulatory / Legal and Technological. Example of a Regulatory / Legal: IMO regulation might affect our transportation cost (part of our supply chain). One risk is the cost imposed by the IMO target of reducing 50% of international shipping GHG emissions. Therefore, it impacts our fuel consumption characteristics for shipping operations, since changes are required to achieve reduced emissions. Opportunities: Vale has used its influence with partners to identify strategic opportunities to implement projects with the potential to achieve more material emissions reductions, such as the charter of Valemax 2G and Guaibamax ships, which reduce emissions by 41% and 38%, respectively, when compared to previously used vessels

Example of a physical risk: The analysis can identify increases in temperature in the areas adjacent to the railways. Increases in the temperature represent a risk because it can cause dilatation of the rails, which are responsible for derailments along the railways.

Downstream

Risk is the effect of uncertainty on organizational objectives, manifested in many ways and potentially impacting all dimensions of the business.

Our main Transitional risk related to downstream are: Market and Reputation.

Example of a market transition risk: - Changes in supply and demand due to awareness of cleaner products, driving reduction in coal use. Reputation: Consumer and investor perceptions of the Company's adherence to greener policies

Case study: This risk represents a great opportunity to continue to improve our portfolio in order to provide solutions to our customers and to adapt to potential market demands. Vale has developed premium products that can reduce emissions in steelmaking and fulfill regional needs. More than 85% of our products are premium products, as a result, we can save today 30 million tonnes of CO₂, or about 9% of the scope 3 emission. An example of that is the GF88, a new product to supply the growing market of pellet production in China, which consists of Carajás fines (IOCJ) obtained through a unique grinding process, opening a new Market for our high-quality portfolio.

Example of a physical risk: Unexpected weather conditions or other force majeure events may delay or hinder our ability to produce the expected amount of minerals and meet customer specifications, which may trigger price adjustments.

C2.2a

(C2.2a) Which risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	<p>Vale uses a risk matrix that considers the severity and probability of each occurrence. In the case of risks related to climate change, Vale has developed specific analysis methodologies divided between impacts arising from Transitional risk (Regulatory changes, Legal, Technological, Market and Reputation) and Physical risk (physical Acute and physical Chronic), according to TCFD.</p> <p>Vale has also implemented a proprietary carbon pricing model to assess risks linked to climate change, by projecting possible impacts on the operating costs of each business unit. This model takes into account the impacts on direct cost, including impacts on the supply chain. Main Climate-related Regulatory risks mapped by Vale, for example:</p> <ul style="list-style-type: none"> • More stringent emission regulations, particularly on the Chinese iron and steel industry, may come to have a negative impact on demand for iron ore and metallurgical coal; • Increasing restrictions, adopted by the IMO, will make it mandatory to reduce shipping emissions, which may be reflected in the average freight cost; • Operating in countries with a sparse or under-developed renewable energy capacity leads to reliance upon an emissions profile which in time may come to be restricted • Country-specific carbon pricing policies will affect margins for carbon intensive businesses. <p>Policy and regulatory risks are particularly relevant for Vale where regulations aimed at reducing emissions may have a particularly direct effect on our operations, value chain, and demand for our products. For example: Currently 20% of global emissions are priced. 27% of mining emissions are subject to carbon pricing (in South Africa, Chile, Canada, Japan and the EU). Vale has a low exposure to carbon pricing, but if Brazil adopts carbon pricing, this reality changes completely, and may lead to a consequent increase in the cost of our products.</p>
Emerging regulation	Relevant, always included	<p>Vale follows trends and studies on climate change in global forums, which aim to determine regulatory and economic strategies to mitigate risks and adapt worldwide. The emergence of more restrictive policies and regulations regarding air pollution and resource extraction lead to adaptation challenges for companies involved in the extraction and transformation of natural resources, such Vale.</p> <p>For example: Some studies carried out by the Brazilian government indicate that the NDC will only be achievable if the carbon emission is priced at US \$ 10 / tCO₂e. If Brazil adopts this carbon pricing, the</p>

		<p>consequence will be the increase in the cost of our products, in addition to indirect costs, such as those of the value chain (mainly energy supply and impacts on contract costs).</p> <p>The construction of climate-related scenarios allows Vale to identify indicators to monitor the external environment and more quickly recognize changes in scenarios, allowing for an agile adaptation to current needs. As a result, the company invests in businesses and technologies that support the growth of a low carbon economy and provide solutions for the supply chain and a society as a whole.</p> <p>In 2019, we approved the target to become carbon neutral by 2050, and to propel us towards decarbonization, we approved an internal carbon price of USD 50/tCO_{2e}. This price is also aligned with the 2°C scenario, following the recommendations of the Carbon Pricing Leadership Coalition.</p>
Technology	Relevant, always included	<p>Since 2011, the Vale technology department promotes several seminars with the national and international scientific community to discuss the future of the mining sector and the perspectives for the industry. The main topics are climate change and natural phenomena, production, and utilization of energy, planning and integrated management of resources and sustainable practices throughout the value chain. This department has set up a group of researches focused on climate change that seeks to understand the science of climate change and to develop new technologies aiming for a better adaptation of Vale in the new low-carbon economy. Main Climate-related Technology risks mapped by Vale: In our climate change report, we deem that new technologies in the steelworks chain, such as the transition to EAF furnaces, may come to reduce demand for iron ore and metallurgical coal, to be replaced with scrap.</p> <p>The Vale is already working with this scenario due to this change in market demand. For example: our net operating revenues from sales of coal decreased by 37.9%, in 2019. The decrease is mainly attributable to lower sales volumes for both thermal and metallurgical coal and lower realized sales prices, in each case for both thermal and metallurgical coal, as consequence of deteriorated market conditions. This risk represents a great opportunity to continue to improve our portfolio in order to provide solutions to our customers and to adapt to potential market demands</p> <p>Vale invests in R&D to identify less carbon intensive initiatives, including alternatives that may lead to a diversification of Vale's activities and access to new markets.</p>
Legal	Relevant, always included	<p>For Transitional risk (Regulatory changes, Legal, Technological, Market and Reputation), Vale created a carbon pricing model that foresees possible future impact on operational cost for each Business. It includes direct costs due to carbon pricing mechanisms and indirect costs, considering the impact on the supply chain related to carbon pricing</p>

		<p>mechanisms.</p> <p>Environmental legislation is becoming more stringent around the world, which can lead to higher costs for compliance with environmental laws. We expect more attention from several governments on issues associated with reducing greenhouse gas emissions as a result of climate change concerns, especially as of the entry into force of the Paris Agreement at the end of 2016. Through this, Vale works to identify and mitigate legal risks.</p> <p>In 2019, the company reviewed its climate goals, including new commitments to reduce greenhouse gas (GHG) emissions, bolder goals than previously established in 2018, aiming to become a carbon neutral mining company.</p> <p>The 33% absolute scope 1 and 2 emissions reduction target by 2030, with 2017 as a baseline, is aligned with the Paris Agreement's objective of limiting global warming to below 2°C.</p>
Market	Relevant, always included	<p>For Transitional risk (Regulatory changes, Legal, Technological, Market and Reputation), Vale created a carbon pricing model that foresees possible future impact on operational cost for each Business. It includes direct costs due to carbon pricing mechanisms, considering the impact on the supply chain related to carbon pricing mechanisms.</p> <p>Vale has developed an integrated risk management framework that considers the impact on our business of not only market risk factors but also risks associated with failed or inadequate internal processes, people, systems or external events (operational risk), risks arising from third-party obligations (credit risk), risks arising from exposure to legal penalties, fines or reputational losses associated with non-compliance with applicable laws and regulations, internal policies or best practices (compliance risk) and risks associated with political and regulatory conditions in the countries in which we operate (strategic risk), among others. One of the market-related climate risks would be the change in consumer mentality, with the search for products with a lower carbon footprint, which will drive the reduction in the use of coal.</p> <p>For example: our net operating revenues from sales of coal decreased by 37.9%, in 2019. The decrease is mainly attributable to lower sales volumes for both thermal and metallurgical coal and lower realized sales prices, in each case for both thermal and metallurgical coal, as consequence of deteriorated market conditions.</p> <p>This risk represents a great opportunity to continue to improve our portfolio in order to provide solutions to our customers and to adapt to potential market demands. Vale has developed premium products that can reduce emissions in steelmaking and fulfill regional needs. More than 85% of our products are premium products, as a result, we can save today 30 million tonnes of CO₂, or about 9% of the scope 3 emission. An example of that is the GF88, a new product to supply the growing market of pellet production in China, which consists of Carajás</p>

		<p>finer (IOCJ) obtained through a grinding process, opening a new Market for our high-quality portfolio. The Climate Change team works in partnership with the Market Intelligence, Marketing, Metallics and Strategic Planning teams to further understand, map, analyse and mitigate market climate-related risks.</p>
Reputation	Relevant, always included	<p>Risks and opportunities related to climate change are the responsibility of the Sustainability Department and are identified based on strategic business planning, existing risk management processes and regulatory environment monitoring. These topics are periodically presented to the Risk Management Executive Committee, where they are reviewed for quarterly reporting to the Board of Directors and published in the Annual Report and the Sustainability Report. Identified risks are monitored and reviewed annually if no material change occurs during the year.</p> <p>Vale has an area that monitors and manages all reputational risks, such as Consumer and investor perceptions of the Company's adherence to greener policies. In the Climate Change Report of 2018 in relation to the reputation-related climate risk, it is worth noting that coal, one of Vale's products and traditionally recognized as a highly polluting element in all production chains, tends to be increasingly associated with companies that disrespect greener policies. Consequences for the business involve possible loss of Market share and loss of revenue. The Board of Directors is continuously evaluating these risks as well as opportunities to further align Vale's portfolio to a low carbon economy. In 2019, Vale is committed to the new pact with society is to positively impact society, going beyond taxes, social projects and reparation of Brumadinho, by becoming a development enabler in the areas where we operate and fostering a safer and more sustainable Brazilian mining industry.</p> <p>Also, in 2019, the company published a group of sustainability goals (link to the governance part - goals), including new commitments to reduce greenhouse gas (GHG) emissions, bolder than goals established previously in 2018, aiming to become a carbon neutral mining company:</p> <ul style="list-style-type: none"> • To reduce the absolute emission of scopes 1 and 2 in 2030, aligned with the Paris Agreement; • To become carbon neutral (scope 1 and 2) by 2050.
Acute physical	Relevant, always included	<p>Based on IPCC studies, Vale, in partnership with "Instituto Tecnológico Vale", developed a model for projecting and mapping potential physical impacts that pose risks to the company's operation. For acute physical risks, the possibility of exacerbation of periods of rain and drought was identified, as well as natural disasters such as hurricanes and tsunamis, which can affect ore production and distribution, leading to losses. For the estimation, we considered an average loss of 0.5% in the production of iron ore and coal due to abnormal precipitation conditions.</p>

		<p>For example: In Mozambique, the risk of drought has been impacting coal production, while in the northern region of Brazil, excess humidity from increased precipitation has an impact on the production and shipping of iron ore.</p> <p>These risks are monitored on an asset level using sensors and satellite data, consolidate in the company's Integrated Operations Center and mitigated through production planning and emergency response.</p>
Chronic physical	Relevant, always included	<p>Based on IPCC studies, Vale, in partnership with "Instituto Tecnológico Vale", developed a model for projecting and mapping potential physical impacts that pose risks to the company's operation. For the chronic physical risk it was identified the possibility of sea-level rise which may affect the production and distribution of the ore, leading to losses.</p> <p>For example: a possible long-term mapped impact is Vale's Guaíba Island (TIG) terminal in Mangaratiba, Rio de Janeiro, which due to rising sea levels may become unusable or will need investment for adaptation. Mitigation actions at TIG that are underway: drainage solutions, containment of overflow water from the patio and emergency/permanent treatment stations.</p>

C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Downstream

Risk type & Primary climate-related risk driver

Technology

Substitution of existing products and services with lower emissions options

Primary potential financial impact

Decreased revenues due to reduced demand for products and services

Company-specific description

Vale revenue from coal sales could be affected by lower emission policies, such as Carbon Taxes and Emission Trading Schemes. In countries such as Canada, China and

the United Kingdom for example, emissions from thermal electricity generation or from the use of fossil fuels for other purposes are already being considering for tax paying, which could divert our coal costumers.

Climate change policies may continue to adversely impact coal demand on our clients in Europe, North America and China. However, consumption in other developing Asian economies such as Southeast Asia and South Asia is expected to expand. On the supply side, current investments are low and the lack of new project development is expected to keep supply at current levels. Weather (warm winters, rains, summer temperatures) and alternative energy (natural gas and renewables) should play a prominent role on coal demand and prices during 2020.

Our sales of coal represented 2.7% of our total net operating revenues in 2019 and decreased by 37.9% compared to 2018. The decrease is mainly attributable to lower sales volumes for both thermal and metallurgical coal and lower realized sales prices, in each case for both thermal and metallurgical coal, as a result of deteriorated market conditions. Sales volumes of thermal coal totalled 4.356 million metric tons (“Mt”) in 2019, decreasing 1.037 Mt when compared to the same period in 2018, while sales volumes of metallurgical coal totalled 4.427 Mt in 2019, decreasing 1.813 Mt in relation to 2018.

This risk represents a great opportunity to continue to improve our portfolio in order to provide solutions to our customers and to adapt to potential market demands.

Time horizon

Short-term

Likelihood

Virtually certain

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

622.000.000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Coal consumption for power generation has fallen for the fifth consecutive year in Europe, and demand is estimated to drop by more than 12% year-on-year. It is possible to assume a trend of continuous decrease in the demand for coal and that the impact of this decrease will perpetuate in the coming years.

Our net operating revenues from sales of coal decreased from US\$1.643 billion in 2018

to US\$1.021 billion in 2019 (impact of US\$622 million). The decrease is mainly attributable to lower sales volumes for both thermal and metallurgical coal and lower realized sales prices, in each case for both thermal and metallurgical coal, as a result of deteriorated market conditions.

Cost of response to risk

1.900.000.000

Description of response and explanation of cost calculation

Vale invests in R&D to identify less carbon intensive initiatives, including alternatives that may lead to a diversification of Vale's activities and access to new markets.

An initiative to respond to this risk is the S11D project. This project aims at increasing mining production with the introduction of innovative solutions, such as the truckless system, which will reduce diesel consumption and produce high quality ore, contributing to GHG emission reductions. It is worth noting that this project represents a major shift in production stream, thus, requiring large initial investments in the short-term. However, benefits in the long-term are expected to be higher, considering not only avoidance of compliance expenses with GHG pricing systems, but also increase in process efficiency and in high quality ore production.

BNDES has provided us with credit line of US\$1.9 billion) financing for our S11D project and its infrastructure (CLN S11D).

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Emerging regulation

Carbon pricing mechanisms

Primary potential financial impact

Increased indirect (operating) costs

Company-specific description

As a mining company, Vale is an energy intensive company, that relies in fossil fuels to operate. If carbon is priced, it will represent a direct cost for operations. Besides, some carbon pricing systems in regions where Vale is present (Europe, Canada, Japan, China), include the mining activity under their carbon programs. This might result in higher compliance costs. This is a transition risk (Policy and legal: Increased pricing of GHG emissions) according to TCFD. The pricing of greenhouse gas emissions may impact our operational costs, mainly through higher price for fossil fuels as mining is an

energy intensive industry, and our cost of international freight. In particular, consumption of thermal coal, one of the products we sell, is facing pressure from international institutions due to its carbon intensity.

For instance, Japanese Carbon Tax take the form of a surcharge over existing oil and coal taxes, and it is included in the purchase price of these fuels. The tax was designed that JPY 289 was imposed on 1 ton of carbon dioxide emitted. The tax rate was set at a low level at first and then gradually raised in three stages: October 2012, April 2014 and April 2016. In 2019, Vale was taxed by US\$ 15,230 (1.6M yen) due to its emissions in Japan.

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

113.000.000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Some studies developed by the Brazilian government appoint that the NDC will only be achievable if the carbon emission is priced at USD 10/tCO_{2e}. Estimating the financial implications may be complex since it depends on how legislation will be downscaled for each sector. Indirect impacts, such as those in the value chain (mainly energy supply and impacts in contracts costs) are also difficult to be estimated. However, an approximation can be done considering the risk if Vale's total scope 1 emissions (approximately 11.3 MtCO_{2e}) were taxed. This tax would represent US\$ 113,000,000.

Cost of response to risk

150.000

Description of response and explanation of cost calculation

Vale developed a carbon pricing model that estimates potential operational cost due to: emissions costs; fossil fuel price increases due to carbon pricing and electricity cost increase due to carbon pricing. Based on that model, Vale is able to increase internal awareness and manage risk related to carbon pricing at business units. Regarding the engagement in regulatory discussions and internal regulatory management process

made by Vale employees. The update Vale's GHG Inventory, Vale's Carbon Goal portfolio, GHG emissions and reductions monitoring and the update of Vale's Marginal Abatement Cost (MAC) Curve cost about USD 150,000 per year.

Comment

Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Chronic physical

Changes in precipitation patterns and extreme variability in weather patterns

Primary potential financial impact

Increased indirect (operating) costs

Company-specific description

Changes in precipitation patterns may affect Vale's operational procedures. The lack of water resources may jeopardize the maintenance of air quality in operations, a mandatory condition to operate. On the other hand, a heavy rainy season may impact the piles' stability, railway operation and the quality of the product (high humidity in the ores). Changes in precipitation patterns may present a risk to Vale's operations, as heavier rainfall may cause damage to equipment and logistic assets, reducing or even disrupting production.

For example in Mozambique, the issue of water restriction may cause stops in the extraction and production of coal due to water being necessary to control particulate emissions during the production process. As for Northern Brazil, the impact on ore shipment due to humidity is directly related to the increase in average rainfall in the northern region, namely in Porto Ponta da Madeira, in the state of Maranhão. Above-average rainfall causes railroad stops due to flooding and ore loading in Porto that need to comply with quality criteria and standards to avoid problems in shipping.

Time horizon

Long-term

Likelihood

More likely than not

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

106.605.000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

It depends on the type of asset/operation that will be impacted. There may be Capital Expenditure necessary to replace a damaged asset. The physical impact may increase operational costs, maintenance costs, etc. For the estimation, we considered an average loss of 0.5% in the production of iron ore and coal due to abnormal precipitation conditions. Considering 2019's iron ore net operating revenues of US\$20.3 billion, it would have accrued a loss of about US\$ 101.5 million per year. Considering the net operating revenues from sales of coal US\$1.021 billion the coal shipments would have accrued a loss of about US\$ 5.1 million per year. Moreover, damages suffered by Vale's logistics complex in the Northern region of Brazil can affect the entire operation, because all product from the Carajás mine is transported by rail to the port. The potential financial impact was US\$106.6 million in 2019.

This value represents 0.5% of the net operating revenues from iron ore and coal combined (US\$ 101.5 million + US\$ 5.1 million = US\$ 101.6 million).

Cost of response to risk

0

Description of response and explanation of cost calculation

Vale developed a physical impact map regarding precipitation and temperature patterns change due to climate change. This map helps business areas to identify operational risks related to climate change or to further evaluate other operational risks considering climate change impacts. It is part of Vale's integrated Risk Management. For example, the projection analysis of precipitation and temperature in the regions surrounding Carajás Railway (EFC) and Vitória to Minas Railway (EFVM) can indicate tendencies in increasing precipitation and also more intense dry periods. Besides that, it can indicate trends in increasing temperatures, which favors thermal expansion of rails and are responsible for derailments.

The periodic risk analysis considering climate change aspects for all Vale businesses and operations is considered to be routine and its costs have been absorbed by the company. Vale has an operational risk area which conducts periodic risk analysis for all Vale businesses and operations, including those related to climate change.

Comment

C2.4

(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.4a

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Opp1

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

Use of lower-emission sources of energy

Primary potential financial impact

Returns on investment in low-emission technology

Company-specific description

In 2019, Vale anticipated its goal for self-sufficiency in clean energy in Brazil to 2025 and globally to 2030. To achieve this goal, the company, among other actions, has structured a roadmap of initiatives, which involves restructuring the current generation portfolio to implement projects and partnerships to insert wind and solar energy sources. An example of these initiatives was the approval in 2019 to implement the Acauã and Gravier wind farms, which together have an installed capacity of 180 MW. In 2021, when they start commercial operation, they will allocate 55% of the energy generated to Vale, via Aliança Geração, increasing the share of wind energy in the electric matrix. Also, Vale is working on the development of the Powershift program, which goals include: become self-sufficient in electricity generation by prioritizing renewable sources; high energetic performance in Vale's productive chain; and change fossil fuel equipment for electrical ones.

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

20.700.000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

The presented financial impact refers to the amount that would be spent with carbon pricing systems if the emissions reduced through the energy related climate actions would have to paid for via compliance. Therefore, we estimate these actions can reduce up to 2.070.000 tCO₂/year. Some studies, developed by the Brazilian government point out that the NDC will only be achievable if the carbon emission is priced at USD 10/tCO₂e. Multiplying these values, the financial impact would be USD 20,700,000.

Cost to realize opportunity

1.900.000.000

Strategy to realize opportunity and explanation of cost calculation

Vale is investing in research and development (R&D) to change the energy matrix. As an estimate, the cost to realize opportunity refers to Vale's investments in the S11D project. This project aims at increasing mining production with the introduction of innovative solutions, such as the truckless system, which will reduce diesel consumption and produce high quality ore, contributing to GHG emission reductions. It is worth noting that this project represents a major shift in production stream, thus, requiring large initial investments in the short-term. However, benefits in the long-term are expected to be higher, considering not only avoidance of compliance expenses with GHG pricing systems, but also increase in process efficiency and in high quality ore production. BNDES has provided us with a credit line of US\$1.9 billion financing for our S11D project and its infrastructure (CLN S11D).

Comment

Identifier

Opp2

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Resilience

Primary climate-related opportunity driver

Resource substitutes/diversification

Primary potential financial impact

Increased value of fixed assets

Company-specific description

The Vale Natural Reserve (VNR) is one of the main protected areas maintained by Vale. With an approximate extension of 23 thousand hectares, it is located in the North of the State of Espírito Santo, Brazil and has the title of Advanced Post of the Atlantic Forest Biosphere Reserve, granted in 2008 by the MaB Program (Man and Biosphere), of UNESCO. It is an important area for the conservation of the flora and fauna of this biome, protecting the main remnants of the Tabuleiros' Atlantic Forest of the entire Southeast Region. The Vale Natural Reserve, in 2019 has just completed its 41th anniversary as an officially protected area, dedicated exclusively to the conservation and scientific research of fauna and flora, is part of the Linhares-Sooretama Forest Complex. Together with the Biological Reserve of Sooretama, the Private Reserves of Natural Heritage Mutum-Preto and Recanto das Antas, in addition to other small forest fragments of the surroundings, are part of a forest block with more than 50 thousand hectares of preserved Atlantic Forest. In addition to its biological and research importance, VNR also allows the identification of several sources of Economic Value of Environmental Resources, such as: value of existence in the preservation of species, value of option with the benefits of bioprospecting, value of direct use in activities of recreation and carbon storage and values of indirect use of water, air and soil regulation services and water supply and pollination. VNR is an important remnant of the Atlantic Rainforest, which protects about 5 thousand species of plants and animals, including more than 160 endangered species and 64 endemic species. By ensuring, for the next generations, the conservation of an area so rich in biodiversity, integrating and raising awareness of neighboring communities, VNR collaborates with the environmental improvement of the entire biome. In addition, it stimulates the advancement of research in the areas of Ecology and the Generation of a Local Economy, which improve people's lives, linked to Sustainable Development, through their activities.

Time horizon

Long-term

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1.100.000.000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Vale Natural Reserve conducted a total economic value (TEV) study, aimed at identifying the financial values associated with environmental resources. The study, conducted in partnership with the Lawrence Berkeley Laboratory, University of California, assigned to Vale Natural Reserve a total intangible value estimated at US\$1.1 billion. This amount can be divided in three aspects: almost US\$1 billion is allocated to the economic benefits of the existence of biodiversity at Vale Natural Reserve; US\$77 million are related to the direct use value, derived from the carbon stored in the reserve, the carbon sequestered by plants produced in the nursery and recreation activities, and approximately US\$25 million associated with the indirect use value, such as pollination, water supply and regulation of air, water and soil.

Cost to realize opportunity

3.300.000

Strategy to realize opportunity and explanation of cost calculation

For Vale, biodiversity and ecosystem services – benefits that people receive from ecosystems, such as clean water, erosion control, etc. – are essential and intrinsic themes to your business. Vale's strategy for Biodiversity is based on the Sustainability Policy, with the long-term objective of achieving the Neutral or Positive Net Impact (PNI) on biodiversity based on the sustainable management of the territories in which it operates and is guided by three main axes: (i) Risk and Impact Management (ii) Environmental Attributes Management; (iii) Performance Management. And to implement and consolidate this strategy, Vale adopts as approaches and tools the Hierarchy of Impact Mitigation, Risk Analysis / Sensitivity Biodiversity, Database and Local/Action management Plans. As an example of a project, the Vale Natural Reserve (RNV in Portuguese). For 35 years, Vale has been maintaining 23 hectares of Vale Natural Reserve in Linhares, Espírito Santo, where 20% of the birds registered in Brazil and more than 2,800 species of plants can be found. The company invests US\$3.3 million in the reserve, one of the last great remnants of the threatened Tabuleiro and Posto Avançado Forest at the Atlantic Forest Biosphere Reserve. In addition to the conservation of flora and fauna, at the reserve there are education and recreation activities, scientific research (with over 100 scientific articles published), as well as seedling nursery, that since 1976 has contributed to the reforestation of more than 18,000 hectares.

Comment

Vale has been seeking to increasingly integrate biodiversity management and ecosystem services into its strategy and business, as these services are essential and intrinsic to the company's operations and life on the planet. The company's guidelines regarding biodiversity, as it is a cross-cutting topic, are reflected in its Sustainability Policy. In 2019, Vale prepared a normative standard containing guidelines and

processes for biodiversity management, focused on all stages of the life cycle, from project planning to post-closing, published in early 2020. The document reflects the company's commitments focused on risk and impact management, aligned with Vale's long-term objective to neutralize impacts aiming to reduce significant biodiversity loss.

Identifier

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Ability to diversify business activities

Primary potential financial impact

Other, please specify

Shift in consumer preferences

Company-specific description

Nickel and copper may be positively impacted by increased demand for electrical vehicles, once those metals are used in batteries. According to a McKinsey study, growth in nickel-intensive batteries is expected to boost demand for batteries by a factor of ~17 up to 2025 (from ~30 kt to 570 kt). This is relevant for Vale since around 16% of revenues come from nickel and copper products. We believe our operations are competitive in the nickel market because of the high quality of our products and our comparatively low production costs.

Throughout 2019 and 2020 we have accepted delivery of numerous battery electric vehicles within North Atlantic's underground operations. These vehicles are being trialed across several operations to provide learnings and diversified feedback to the business. By the end of 2020 we expect to have over twenty battery powered vehicles operating as a part of the Green Energy Vehicle trial program. Key operating and performance metrics will be collected, tracked and shared throughout the trial phase to expedite the validation of this technology and to improve our internal understanding of its impacts on the business. We expect to see a decrease in diesel fuel consumption as our fleet transitions to alternative energy sources as a part of this program, for example, Creighton mine, that is home to the largest fleet of battery electric vehicles within Vale as it is recognized as the GEV pilot project.

Time horizon

Long-term

Likelihood

Likely

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

21.128.820

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

This impact is difficult to estimate, since changes in demand depend on several factors and on complex social and economic relations. However, we can estimate the impact magnitude considering, for example, a 0.5% increase in nickel and copper demand. The nickel volume sold in 2019 was 206 kt, at an average price of USD 14,064 /t, and copper volume was 244 kt, at an average price of USD 5,445 /t. The potential financial impact figure is calculated by multiplying the volume sold by the average price and the percentual increase in demand (0.5%).

Nickel: $(206\text{kt}) \times (\$14,064/\text{t}) \times 0.5\% = \$ 14.485.920$

Cooper: $(244\text{kt}) \times (\$5,445/\text{t}) \times 0.5\% = \$ 6.642.900$

$\$ 14.485.920 + \$ 6.642.900 = \$ 21.128.820.$

Cost to realize opportunity

18.850

Strategy to realize opportunity and explanation of cost calculation

Vale is currently monitoring this opportunity through public studies and announcements of the electric vehicles industry. However, nickel prices and demand should first shift, in order to drive more precise actions.

The cost to manage this opportunity would be related to increase in nickel and copper production. The value presented is related to an increase in 0.5% on their production costs in 2019 (total of USD 3.77 million), representing an increase of USD 18,850 (0.5% of the total production cost). However, it should be noted that costs and demand do not present a linear relationship and many factors, such as production volume and market prices, could influence on the management cost.

Comment

C3. Business Strategy

C3.1

(C3.1) Have climate-related risks and opportunities influenced your organization’s strategy and/or financial planning?

Yes, and we have developed a low-carbon transition plan

C3.1a

(C3.1a) Does your organization use climate-related scenario analysis to inform its strategy?

Yes, qualitative and quantitative

C3.1b

(C3.1b) Provide details of your organization’s use of climate-related scenario analysis.

Climate-related scenarios and models applied	Details
IEA Sustainable development scenario IEA NPS IEA CPS	<p>The analysis of climate-related scenarios allows Vale to identify indicators to monitor the external environment and more quickly recognize changes in the scenarios, allowing an agile adaptation to current needs. To test its strategy’s resilience, Vale used Current Policies, New Policies and Sustainable Development scenarios from the World Energy Outlook 2017, published by the IEA, due to its coverage of a broad spectrum of possibilities for risks and opportunities. Each scenario was evaluated in a 12 years horizon (up to 2030). The analysis enabled to identify Vale’s high degree of resilience of segments of ferrous minerals and base metals, as well as the risk in the coal segment, for example. Using the scenario analysis, Vale is able to define mitigating actions to capture the opportunities and minimize the climate-related risks which the company is exposed to. This analysis covers all the business areas in which Vale operates, globally.</p> <p>In 2019, the results of the scenario analysis supported the Climate Change Policy review, influencing the company’s strategy and financial planning. Thereby, the company adopted an internal carbon pricing based on a shadow price of US\$ 50/tCO_{2e} to be incorporated into cost analysis and overall investment decision-making processes. A project capture tool was implemented which considers that all new projects from 1 June 2020 onwards must be submitted for analysis. That is, all projects must quantify their emissions and include in their NPV the amount corresponding to their emissions considering the carbon shadow price of US \$ 50 per ton of CO_{2e}. Thus, the tool and methodology aim to prioritize projects that promote emission reductions or that emit less. In addition, training was conducted for all areas of</p>

	Vale that have or promote projects related to engineering or production processes in the company.
RCP 4.5 RCP 8.5	To evaluate climate change impacts on Vale’s North and South-Southeast railways –Carajás Railway (EFC) and Vitória to Minas Railway (EFVM), respectively –, scenario analysis was conducted with the use of the 3rd generation of PRECIS (Providing Regional Climates for Impact Studies) modeling system. Because regional climate models have a much higher resolution than global climate models, the results provide climate information with useful local detail including realistic extreme events. It performs downscaling with the input data provided by the HadGEM2 global model. The use of PRECIS in Vale’s Technological Institute (ITV) is part of a research collaboration with the National Institute for Space Research (INPE). The models were constructed for the surroundings of EFC and EFVM for temperature and precipitation in the RCP 4.5 and RCP 8.5 scenarios defined by the International Panel on Climate Change (IPCC), considering future climate projections for 2050 and 2100. The analysis can identify increases in temperature in the surroundings of the railways. Increases in the temperature represent a risk because it can cause dilatation of the rails, which are responsible for derailments along the railways.

C3.1d

(C3.1d) Describe where and how climate-related risks and opportunities have influenced your strategy.

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Products and services	Yes	<p>One of the market-related climate risks would be the change in consumer mentality, with the search for products with a lower carbon footprint, which will drive the reduction in the use of coal. Thus, we are making possible the Substitution of existing products and services with lower emissions options in a short-term.</p> <p>Vale conducts a business resilience test in the various climate change scenarios for a long-term horizon (ten years or more), with the aim of being prepared for the challenges of the transition to a low carbon world.</p> <p>Besides that, Vale revenue from coal sales could be affected by lower emission policies, such as Carbon Taxes and Emission Trading Schemes. In countries such as Canada, China and the United Kingdom for example, emissions from thermal electricity generation or from the use of fossil fuels</p>

		<p>for other purposes are already being considering for tax paying, which could divert our coal costumers. It is difficult to provide a potential financial impact, since it may depend on the policy scope and thresholds. Even though, it is possible to estimate that the impact in sales revenue can be substantial, considering that coal accounted for 2.7% of our operating revenues in 2019. On the other hand, Nickel and copper may be positively impacted by increased demand for electrical vehicles in long-term, once those metals are used in batteries.</p> <p>These risks may also represent significant opportunities for positively transforming company's products and services. Vale expects to develop a portfolio of low-carbon projects throughout the climate change management process whose viability can be stimulated by the consideration of the internal carbon price, as well as a better understanding of regulatory risks and their impacts; understand and better communicate material opportunities for climate change in business change Vale's energy consumption matrix through higher consumption of renewable energy sources and reduce the carbon footprint of your products. Vale is looking beyond for a greener portfolio in the long term and a great example of that is the Tecnoled technology. This technology is being prepared to use biomass to supply the energy and reductant needs for pig iron production. It may extend the lifespan of the mines and reduce the environment impacts through high productivity and lower CO2 emissions.</p>
Supply chain and/or value chain	Yes	<p>Vale is already seeing an impact on some supply chain strategies based on climate-related risks, for example one short-term risk is the cost imposed by the International Maritime Organization (IMO) target of reducing 50% of international shipping GHG emissions. It impacts the fuel consumption of our shipping operations, since they have to be changed for other less emitting sources. That impact was identified as being particularly relevant for us since Vale depends on the global shipping sector to transport and distribution of our products.</p> <p>Case study: As short-term strategy, Vale has analysed the documents regarding the establishment of a global data collection system for either a mandatory or voluntary application of the system for collection of fuel consumptions, monitoring CO2 emissions from ships and possible verifying by the flag States. Along with that, Vale has used its influence with partners to identify strategic opportunities to</p>

		<p>implement projects with the potential to achieve more material emissions reductions, such as the charter of 30 Valemax 2G and 47 Gvaibamax ships, which reduce emissions by 41% and 38%, respectively, when compared to previously used vessels. Vale also engages several R&D partnerships aimed at evaluating options for vessel efficiency gains and reducing GHG emissions. Exploring new technologies and investing in both R&D and mature solutions with high potential is crucial to understand our options and incentivize the broader community on the uptake of sustainable solutions</p> <p>Vale created the Carbon Program in the Value Chain. Initially, the program involved the training of suppliers to prepare an inventory of GHG emissions. Nowadays provides for the annual reporting commitment of GHG emissions from suppliers critical to Vale, as well as other information on emission management. This commitment is formalized through the insertion of a voluntary clause in contracts signed in Brazil. The program is aimed at companies from any region, provided they have active contracts with Vale. From 2020, Vale suppliers will consider the emission terms in the supply chain that will be invited to participate in the CDP Supply Chain program. Our company now selects another 120 companies that use CDP's internationally customized and standardized reporting platform to generate strategic suppliers on environmental issues.</p>
Investment in R&D	Yes	<p>Investment in research and development represents a crucial risk mitigation strategy for a long-term horizon (ten years or more) and a substantial opportunity, generating the development of new technologies capable of increasing productivity and decreasing GHG emissions.</p> <p>Vale enrolls in partnerships with academies and scientific institutions, and with local governments aiming at the development of Brazilian scientific capacity to study physical impacts and to propose adaptation measures. For example, Vale created the Center for Advanced Climate Studies in partnership with the Espírito Santo Government and the University of Espírito Santo. The center has the objective of conducting climate-related researches that will assist the state, the country and Vale itself to better understand the climate change issues and how to deal with them. The center had an initial financial contribution of \$175 thousand dollars from Vale and already has 21 projects under development.</p>

		<p>In 2019, 21 research and development (R&D) projects were approved, which represent a financial contribution of \$1.8 million dollars.</p> <p>Another example is the Vale Technological Institute (ITV), founded in 2009, that is developing low carbon and clean/renewable energy R&D and products. This institute has a dedicated group of researches focused on climate change that seeks to understand the science of climate change and to develop new technologies in order for Vale to better adapt to the new low-carbon economy. So far, 85 masters have graduated, 45% of whom are Vale professionals. In 2019, ITV created the Resident Master's Student Program with the purpose of boosting and influencing local professionals' training on topics related to the 17 Sustainable Development Goals (SDGs), offering ten scholarships. Throughout the year, ITV contributed a total of \$10 million dollars invested in 17 research initiatives with projects that contribute to biodiversity knowledge and conservation.</p> <p>In order to prioritize the most cost-efficient low carbon technologies and R&D projects, Vale uses a Marginal Abatement Cost Curve (MACC), that compares the initiative's emission reduction potential with the carbon pricing needed to make it viable. Most of the technologies mapped and under implementation already have positive NPV (Net Present Value).</p>
Operations	Yes	<p>Vale uses a risk matrix that considers the severity and probability of each occurrence. In the case of risks related to climate change, Vale has developed specific analysis methodologies divided between impacts arising from regulatory changes and physical impacts.</p> <p>For the physical risks of climate change, Vale has developed, in partnership with ITV impact, maps based on the analysis of the Intergovernmental Panel on Climate Change. These maps allow identifying the main changes in rainfall and temperature index throughout the country including in the regions in which we operate due to climate change. This tool helps in the management of physical risks in the operational areas. Example of a physical risk: Changes in precipitation patterns may present a risk to Vale's operations, as heavier rainfall may cause damage to equipment and logistic assets, reducing or even disrupting production.</p> <p>Environmental legislation is becoming more stringent around the world, which can lead to higher costs for compliance with</p>

		<p>environmental laws. Thus, in the medium-term, we will be in compliance with regulations and laws.</p> <p>For strategy and climate change analysis to operations, we consider up to 3 years as short-term, up to 10 years as medium-term, more than 10 years as long-term.</p> <p>Case study: the S11D Project in Carajás was developed using innovative mining technologies to minimize environmental impacts, replacing traditional off-highway trucks for conveyor belts and reduce diesel consumption by about 70 percent. The dry processing cut water consumption by 93% and eliminates the need for tailing dams. The technology used in the S11D Complex makes possible that 300 million metric tons of ultrafine iron ore no longer be discarded as waste. Also, one of Vale’s targets to 2030 is to achieve 100% self-generation of electricity in Brazil by the use of renewable sources of energy and change fossil fuel equipment for electrical ones (Powershift program). The program PowerShift, that seeks to boost innovation and technologies for effective reduction of GHG emissions in operations, in partnership with suppliers, academy and large companies. The program main pillars are the decarbonization of productive processes.</p>
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C3.1e

(C3.1e) Describe where and how climate-related risks and opportunities have influenced your financial planning.

	Financial planning elements that have been influenced	Description of influence
Row 1	Revenues Direct costs Indirect costs Capital allocation	<p>Revenues: Natural disasters can cause serious damage to operations and projects in countries where Vale operates and may have a negative impact on sales to countries affected by such disasters. In its turn, transition risks, in particular, may affect demand for our products and, consequently, revenues.</p> <p>Vale revenue from coal sales could be affected by lower emission policies, such as Carbon Taxes and Emission Trading Schemes. In countries such as Canada, China, Japan and the United Kingdom for example, emissions from thermal electricity generation or from the use of fossil fuels for other purposes are already being considering for tax paying, which could divert our coal costumers.</p> <p>Climate change policies may continue to adversely impact coal demand on our clients in Europe, North America and China. However,</p>

		<p>consumption in other developing Asian economies such as Southeast Asia and South Asia is expected to expand. On the supply side, current investments are low and the lack of new project development is expected to keep supply at current levels. Weather (warm winters, rains, summer temperatures) and alternative energy (natural gas and renewables) should play a prominent role on coal demand and prices during 2020.</p> <p>It is difficult to provide a potential financial impact, since it may depend on the policy scope and thresholds. Even though, it is possible to estimate that the impact in sales revenue can be substantial, considering our net operating revenues from sales of coal decreased by 37.9% to US\$1.021 billion in 2019, from US\$1.643 billion in 2018, as a result of deteriorated market conditions.</p> <p>This impact on our revenues is considered to be medium magnitude and the time horizon covered by the financial planning is long-term. On the other hand, Nickel and Copper may be positively impacted by the increased demand of electric vehicles, that are likely to see market growth driven by both technology and policy developments.</p> <p>Besides that, Vale have been looking beyond for a greener portfolio in the long term and a great example of that is the Tecnoled technology. This technology uses biomass to supply the energy and reductant needs for pig iron production. It may extend the lifespan of the mines and reduce the environment impacts through high productivity and lower CO2 emissions.</p> <p>Direct costs: The price of greenhouse gas emissions affects our operational direct costs, primarily through higher prices for fossil fuels, since mining is an energy-intensive industry and our international freight cost. In particular, the consumption of thermal coal, one of the products we sell, is facing pressure from international institutions due to its carbon intensity. Currently, from the countries where Vale operates, Canada, United Kingdom, and Japan have carbon pricing mechanisms, under ETS and/or a carbon tax. In a future perspective, China scheduled a national ETS and Brazil is discussing ways to implement a carbon pricing mechanism in the next years.</p> <p>Vale also announced US\$2 Billion in investments within the Next Ten Years to reduce its direct and indirect absolute emissions (scopes 1 and 2) by 33% by 2030.</p> <p>This impact on our direct cost is considered to be medium magnitude and the time horizon covered by the financial planning is long-term.</p> <p>Example of a strategy to mitigate this impact is Vale's investments in the S11D project. This project aims at increasing mining production with the introduction of innovative solutions, such as the truckless system, which will reduce diesel consumption and produce high quality ore, contributing to GHG emission reductions.</p> <p>Indirect costs: Considering a future scenario, Vale faces the risk of energy shortages in countries where we maintain operations and projects,</p>
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		<p>especially in Brazil, due to lack of infrastructure or climatic conditions such as floods or droughts. Future scarcity and government efforts to respond to or avoid shortages can have an adverse impact on the cost or supply of electricity in our operations, this cost is also related to carbon pricing, as well as the cost of fossil fuel production.</p> <p>Vale is an energy intensive industry, if fossil fuels and electricity are taxed (and have their prices increased), it is very likely that Vale will face higher direct and indirect costs. This impact on our revenues is considered to be medium-high magnitude and the time horizon covered by the financial planning is short-term.</p> <p>Vale currently has a direct participation in three hydroelectric power plants and three small hydroelectric plants in operation, besides the indirect participation in other ones. Vale anticipated its goal for self-sufficiency in clean energy in Brazil to 2025 and globally to 2030. To achieve this goal, the company, among other actions, has structured a roadmap of initiatives, which involves restructuring the current generation portfolio to implement projects and partnerships to insert wind and solar energy sources. An example of these initiatives was the approval in 2019 to implement the Acauã and Gravier wind farms, which together have an installed capacity of 180 MW. In 2021, when they start commercial operation, they will allocate 55% of the energy generated to Vale, by Aliança Geração, increasing the share of wind energy in the electric matrix.</p> <p>Capital Allocation: Climate issues are considered in our capital allocation framework. Vale's definition to shift energy matrix to renewable is an example of how climate change issues are being discussed at capital allocation discussions, that serve as an action plan for us to reassess the resiliency of our portfolio, with the aggregate magnitude of the risk being low.</p> <p>For example: throughout 2019 Vale has developed a proprietary carbon pricing model to assess risks linked to climate change, by projecting possible impacts on the operating costs of each business unit. This model was officially implemented on June 1, 2020 and takes into account the impacts on direct and indirect costs, including impacts on the supply chain. All project/investments that have a GHG emission associated to its operation and/or will be responsible for the deforestation of native forest during its implantation will estimate its GHG emission and incorporate the shadow price for the project/investment's evaluation and approval.</p> <p>Besides that, Vale has been investing in research and development represents a crucial risk mitigation strategy and a substantial opportunity, generating the development of new technologies capable of increasing productivity and decreasing GHG emissions. Vale unveiled an investment of US\$2 Billion within the next ten years (time horizon covered by the</p>
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		financial planning is medium-term) to reduce its direct and indirect absolute emissions.
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C3.1f

(C3.1f) Provide any additional information on how climate-related risks and opportunities have influenced your strategy and financial planning (optional).

C4. Targets and performance

C4.1

(C4.1) Did you have an emissions target that was active in the reporting year?

Absolute target

C4.1a

(C4.1a) Provide details of your absolute emissions target(s) and progress made against those targets.

Target reference number

Abs 1

Year target was set

2019

Target coverage

Company-wide

Scope(s) (or Scope 3 category)

Scope 1+2 (market-based)

Base year

2017

Covered emissions in base year (metric tons CO2e)

14.100.000

Covered emissions in base year as % of total base year emissions in selected Scope(s) (or Scope 3 category)

100

Target year

2030

Targeted reduction from base year (%)

33

Covered emissions in target year (metric tons CO₂e) [auto-calculated]

9.447.000

Covered emissions in reporting year (metric tons CO₂e)

12.600.000

% of target achieved [auto-calculated]

32,2372662798

Target status in reporting year

New

Is this a science-based target?

Yes, we consider this a science-based target, but this target has not been approved as science-based by the Science-Based Targets initiative

Please explain (including target coverage)

In 2019, the company published a group of sustainability goals, including new commitments to reduce greenhouse gas (GHG) emissions, bolder than goals established previously in 2018, aiming to become a carbon neutral mining company:

- To reduce the absolute emission of scopes 1 and 2 by 33% by 2030, aligned with the Paris Agreement;
- To become carbon neutral (scope 1 and 2) by 2050;
- To adopt a shadow price of USD 50 per ton of CO₂ equivalent, to be used in the economic feasibility studies of projects;
- To adopt a shadow price of USD 10 a ton of CO₂ equivalent for carbon sequestration in forest restoration and reforestation projects;
- To establish ambition to reduce scope 3 emissions.

C4.2

(C4.2) Did you have any other climate-related targets that were active in the reporting year?

No other climate-related targets

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	35	
To be implemented*	2	1.504.139
Implementation commenced*	4	6.968
Implemented*	10	57.076
Not to be implemented	0	

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative category & Initiative type

Energy efficiency in production processes
Fuel switch

Estimated annual CO2e savings (metric tonnes CO2e)

27.671

Scope(s)

Scope 1

Voluntary/Mandatory

Mandatory

Annual monetary savings (unit currency – as specified in C0.4)

0

Investment required (unit currency – as specified in C0.4)

0

Payback period

No payback

Estimated lifetime of the initiative

1-2 years

Comment

Initiative category & Initiative type

Energy efficiency in production processes
Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

17.442

Scope(s)

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

4.574.347

Investment required (unit currency – as specified in C0.4)

1.094.215

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative category & Initiative type

Energy efficiency in production processes
Machine/equipment replacement

Estimated annual CO2e savings (metric tonnes CO2e)

11.936

Scope(s)

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

6.074.050

Investment required (unit currency – as specified in C0.4)

2.529.734

Payback period

<1 year

Estimated lifetime of the initiative

21-30 years

Comment

Initiative category & Initiative type

Energy efficiency in production processes

Electrification

Estimated annual CO2e savings (metric tonnes CO2e)

27

Scope(s)

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

1.990

Investment required (unit currency – as specified in C0.4)

982.656

Payback period

>25 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative category & Initiative type

Energy efficiency in buildings

Heating, Ventilation and Air Conditioning (HVAC)

Estimated annual CO2e savings (metric tonnes CO2e)

0

Scope(s)

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

36.501

Investment required (unit currency – as specified in C0.4)

229.626

Payback period

4-10 years

Estimated lifetime of the initiative

6-10 years

Comment

Implementation started in 2019, and had associated investments, but still without CO2e savings results.

Initiative category & Initiative type

Energy efficiency in buildings

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

0

Scope(s)

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

11.026

Investment required (unit currency – as specified in C0.4)

31.346

Payback period

1-3 years

Estimated lifetime of the initiative

3-5 years

Comment

Implementation started in 2019, and had associated investments, but still without CO2e savings results.

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Compliance with regulatory requirements/standards	<p>Vale is aware of the targets and established its own target in order to comply with Brazilian policy as well as other regulations worldwide. Vale also follows national discussion on the implementation of the NDC.</p> <p>In 2019, Vale is committed to the new pact with society is to positively impact society, going beyond taxes, social projects and reparation of Brumadinho, by becoming a development enabler in the areas where we operate and fostering a safer and more sustainable Brazilian mining industry.</p> <p>Also, in 2019, the company published a group of sustainability goals (link to the governance part - goals), including new commitments to reduce greenhouse gas (GHG) emissions, bolder than goals established previously in 2018, aiming to become a carbon neutral mining company. To reduce the absolute emission of scopes 1 and 2 in 2030, aligned with the Paris Agreement to become carbon neutral (scope 1 and 2) by 2050.</p> <p>In adherence to Vale's Global Climate Change Policy and the climate-related risks and opportunities analysis, Vale created the Carbon Program in the Value Chain. Initially, the program involved the training of suppliers to prepare an inventory of GHG emissions. Nowadays provides for the annual reporting commitment of GHG emissions from suppliers critical to Vale, as well as other information on emission management. This commitment is formalized through the insertion of a voluntary clause in contracts signed in Brazil. The program is aimed at companies from any region, provided they have active contracts with Vale.</p> <p>From 2020, Vale suppliers will consider the emission terms in the supply chain that will be invited to participate in the CDP Supply Chain program. Our company now selects another 120 companies that use CDP's internationally customized and standardized reporting platform to generate strategic suppliers on environmental issues.</p>
Dedicated budget for low-carbon product R&D	<p>Vale enrolls in partnerships with academies and scientific institutions, and with local governments aiming at the development of Brazilian scientific capacity to study physical impacts and to propose adaptation measures.</p> <p>For example, Vale created the Center for Advanced Climate Studies in partnership with the Espírito Santo Government and the University of Espírito Santo.</p> <p>The center has the objective of conducting climate-related researches that will assist the state, the country and Vale itself to better</p>

	<p>understand the climate change issues and how to deal with them. The center had an initial contribution of \$175 thousand dollars from Vale and an approved budget of \$1.8 million dollars to finance 21 projects that are under development</p> <p>Another example is the Vale Technological Institute (ITV), founded in 2009, that is developing low carbon and clean/renewable energy R&D and products. This institute has a dedicated group of researches focused on climate change that seeks to understand the science of climate change and to develop new technologies in order for Vale to better adapt to the new low-carbon economy. The Institute's agenda focuses on biodiversity, environmental services, water resources, environmental genomics, reforestation with native species, recovery of degraded areas, climate change, occupation and use of land and socioeconomics. In addition to research, ITV is involved in training people through the professional Sustainable Use of Natural Resources in Tropical Regions master's program. So far, 85 masters have graduated, 45% of whom are Vale professionals. In 2019, ITV created the Resident Master's Student Program with the purpose of boosting and influencing local professionals' training on topics related to the 17 Sustainable Development Goals (SDGs), offering ten scholarships. Throughout the year, ITV contributed a total of \$10 million dollars invested in 17 research initiatives with projects that contribute to biodiversity knowledge and conservation.</p>
Employee engagement	<p>Vale Climate Change team developed an online course on GHG Inventory and Climate Change, available to any employee, and provides training sessions about the same issues in order to mobilize its employees around the necessity of reducing emissions in the company's operations and projects. Vale also has focal points in the business areas engaged in identifying opportunities to reduce energy and GHG emissions.</p>
Internal incentives/recognition programs	<p>The Sustainability KPI goals program encourages the continuous improvement of the company's performance on material socio-environmental issues. Environmental and social indicators work as metrics to assess the sustainability of the different business areas, reflecting on the variable remuneration of the teams.</p> <p>All of these goals, once defined, are registered and monitored in the Career, Succession and Performance (CSP) system. The Sustainability KPIs integrates the variable remuneration of all Vale employees and impacts all hierarchical levels, up to the CEO.</p> <p>In 2019, the program continued to correspond to 10% of employees' variable remuneration.</p>

Marginal abatement cost curve	Vale developed its own MAC Curve (Marginal Abatement Cost Curve) for identifying the best cost-effective mitigation options and further select and prioritize GHG emission reduction projects.
Dedicated budget for energy efficiency	Most Greenhouse Gases (GHG) emissions are directly linked to energy consumption in operations. Therefore, the company established the Energy Efficiency Program, aimed at ensuring the consolidated accounting of results, multiplication of experiences, and continue and scale consumption optimization actions across operations. In 2019, investments from reduction initiatives implemented in Energy Efficiency came to a total of USD 13.8 million.
Dedicated budget for other emissions reduction activities	Vale Advances on the Climate Agenda and Unveils US\$2 Billion to Reduce Carbon Emissions within the next ten years to reduce its direct and indirect absolute emissions (scopes 1 and 2) by 33% by 2030.
Internal price on carbon	Adoption of an internal carbon price (shadow price) \$ 50 per tonne of CO2 equivalent used in the economic feasibility studies of projects; Adoption of an internal shadow price of US \$ 10 a tonne of CO2 equivalent, for carbon sequestration in restoration projects forestry and reforestation.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products or that enable a third party to avoid GHG emissions.

Level of aggregation

Product

Description of product/Group of products

Iron ore pellets

Vale's iron ore pellets have high iron ore purity and its production process is less carbon intensive when compared to sinter production, which is also an input for steel plants.

The use of Vale's pellets by the clients in their furnaces in substitution of sinter provides a higher concentration of iron in the client's furnace. Therefore, the client has a lower fuel consumption which will result in a reduction of Scope 1 emissions. In 2019, around 15.8% of Vale net operating revenue, was associated with Iron ore pellets production.

Are these low-carbon product(s) or do they enable avoided emissions?

Avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify

Estimate based on benchmarking factors

% revenue from low carbon product(s) in the reporting year

15,8

Comment

Climate change represents a scientifically proven reality and a challenge that affects not only our productive activities, but the entire planet. Combating the impacts of climate change, is a strategic priority on Vale's agenda. Vale has the potential to contribute to a more sustainable future, based on a renewable energy matrix and the different quality of its product.

We have been acting continuously, guided by scientific and practical references in line with our internal policies and standards, to deal with this issue.

Vale has developed premium products that have the ability to reduce emissions in steelmaking and fulfill regional needs. More than 85% of our products are premium products, as a result, we can save today 30 million tonnes of CO₂, or about 9% of the scope 3 emission. An example of that is the GF88, a new product to supply the growing market of pellet production in China, which consists of Carajás fines (IOCJ) obtained through a grinding process, opening a new Market for our high-quality portfolio.

C5. Emissions methodology

C5.1

(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).

Scope 1

Base year start

janeiro 1, 2017

Base year end

dezembro 31, 2017

Base year emissions (metric tons CO₂e)

12.423.267,74

Comment

The 2017 emissions result was adjusted due to data review in Indonesia, certified by a third party, according to the GHG Protocol calculation methodology.

Scope 2 (location-based)

Base year start

janeiro 1, 2017

Base year end

dezembro 31, 2017

Base year emissions (metric tons CO2e)

1.660.968,1

Comment

The 2017 emissions result was adjusted due to data review in Indonesia, certified by a third party, according to the GHG Protocol calculation methodology.

Scope 2 (market-based)

Base year start

janeiro 1, 2017

Base year end

dezembro 31, 2017

Base year emissions (metric tons CO2e)

1.660.968,1

Comment

In 2017, the low carbon energy generated and consumed by Vale, purchased by PPAs, was not tracked by energy attribute certificates. Then, the scope 2 market-based in 2017 (base year) is considered equal to scope 2 location-based.

C5.2

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.

- Brazil GHG Protocol Programme
- Defra Voluntary 2017 Reporting Guidelines
- Environment Canada, Base Metals Smelting/Refining, Guidance Manual for Estimating Greenhouse Gas Emissions
- IPCC Guidelines for National Greenhouse Gas Inventories, 2006
- ISO 14064-1
- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
- The Greenhouse Gas Protocol Agricultural Guidance: Interpreting the Corporate Accounting and Reporting Standard for the Agricultural Sector
- Other, please specify
- NIR 1990-2015 GHG Sources & Sinks Canada

C5.2a

(C5.2a) Provide details of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.

The Scope 1 and Scope 2 emissions of Canadian operations are calculated using the methodologies recommended by the GHG Protocol standard and using the emission factors provided by the National Inventory Report of Canada.

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO₂e?

Reporting year

Gross global Scope 1 emissions (metric tons CO₂e)

11.282.234,21

Comment

The scope 1 and Scope 2 emissions of Vale operations are calculated using the methodology recommended by:

- 2006 and 2019 Refinement IPCC Guidelines for National Greenhouse Gas Inventories
- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
- Brazil GHG Protocol Programme
- ISO 14064-1
- Defra Voluntary 2017 Reporting Guidelines
- Environment Canada, Base Metals Smelting/Refining, Guidance Manual for Estimating Greenhouse Gas Emissions
- Other, please specify (NIR GHG Sources & Sinks Canada)

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We are reporting a Scope 2, market-based figure

Comment

Scope 2 emissions in 2019, accounted by the Market Based methodology, totaled 0.76 million tCO₂e. These emissions, unlike the accounting by the Location methodology, presented above, consider Vale's energy acquisition contracts as well as concession contracts for its own assets, attesting their renewable origin through certificates or declarations from generators. In 2019, from the total energy contracted and consumed via GRID, by Vale's operations in Brazil, we deducted a total of 7 TWh, from renewable sources.

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO₂e?

Reporting year

Scope 2, location-based

1.288.294,72

Scope 2, market-based (if applicable)

764.287,55

Comment

The scope 1 and Scope 2 emissions of Vale operations are calculated using the methodology recommended by:

- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
- Brazil GHG Protocol Programme
- ISO 14064-1
- Defra Voluntary 2017 Reporting Guidelines
- Other, please specify (NIR GHG Sources & Sinks Canada)

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

Yes

C6.4a

(C6.4a) Provide details of the sources of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure.

Source

Solid Waste and Wastewater treatment

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

Emissions are not relevant

Relevance of market-based Scope 2 emissions from this source (if applicable)

Emissions are not relevant

Explain why this source is excluded

In 2009, Vale calculated its indirect GHG emissions from waste and effluent disposal processes (landfill, biological treatment, incineration) and these emissions represented only 0.1% of Vale's total direct GHG emission. Then, Vale decided to exclude these emission sources due to its lack of relevance to the company and to the mining sector.

Source

Fire Extinguisher Fugitive Emissions

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Relevance of market-based Scope 2 emissions from this source (if applicable)

No emissions from this source

Explain why this source is excluded

The GHG fugitive emissions from fire extinguisher have been estimated in 2017 and excluded from Vale GHG Inventory due to their irrelevance to the mining sector and Vale activities.

Source

Emissions from combustion of acetylene

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Relevance of market-based Scope 2 emissions from this source (if applicable)

No emissions from this source

Explain why this source is excluded

The GHG combustion emissions from acetylene use have been estimated in 2017 and excluded from Vale GHG Inventory due to their irrelevance to the mining sector and Vale activities.

C6.5

(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

2.012.248,82

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Quantity of purchased good and services. Emission factors in tonnes of GHG per activity data. Methodology: quantity of purchased good and/or services multiplied by its applicable emission factor, obtained from the Ecoinvent or DEFRA database.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Capital goods

Evaluation status

Not relevant, calculated

Metric tonnes CO₂e

8.019,58

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Quantity of fuel purchased, quantity of electricity purchased, % loss of electricity in transmission lines. Emission factors in tonnes of GHG per activity data. Methodology: emissions are calculated in two steps. First step is to multiply the electricity purchased by the % loss in transmission. 2nd step is to multiply the quantity of fuel and electricity purchased by the applicable emission factor. The emission factors are obtained from the Ecoinvent or DEFRA database and the loss factors are obtained from governments' publications from each country.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

1.304.439,29

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Quantity of fuel purchased, quantity of electricity purchased, % loss of electricity in transmission lines. Emission factors in tonnes of GHG per activity data. Methodology: emissions are calculated in two steps. First step is to multiply the electricity purchased by the % loss in transmission. 2nd step is to multiply the quantity of fuel and electricity purchased by the applicable emission factor. The emission factors are obtained from the Ecoinvent or DEFRA database and the loss factors are obtained from governments' publications from each country.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

11.719.167,19

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Quantity of fuel consumption or travelled distance or time spent; vehicle efficiency; quantity of material transported. Emission factors in tonnes of GHG per activity data. Methodology: emissions are calculated using three different approaches. a) Quantity of fuel consumed multiplied by the applicable emission factor; b) estimate the fuel consumption from the travelled distance or time spent and vehicle efficiency and thus

calculate the emissions with the quantity of fuel consumed multiplied by the applicable emission factor; c) Quantity of material transported multiplied by the distance (one way, between departure and arrival) and by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Waste generated in operations

Evaluation status

Not relevant, explanation provided

Please explain

In 2009, Vale calculated its indirect GHG emissions from waste and effluent disposal processes (landfill, biological treatment, incineration) and decided to exclude these emission sources due to their insignificance and irrelevance to Vale and the mining sector.

Business travel

Evaluation status

Not relevant, calculated

Metric tonnes CO₂e

22.059,79

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Flight distance by stretch and number of flights by stretch. Emission factors in tonnes of GHG per activity data. Methodology: distance by stretch multiplied by the number of flights and by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Employee commuting

Evaluation status

Not relevant, calculated

Metric tonnes CO₂e

33.654,4

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Quantity of fuel consumption or travelled distance or time spent; vehicle efficiency. Emission factors in tonnes of GHG per activity data.

Methodology: emissions are calculated using two different approaches. a) Quantity of fuel consumed multiplied by the applicable emission factor; b) estimate the fuel consumption from the travelled distance or time spent and vehicle efficiency and thus calculate the emissions with the quantity of fuel consumed multiplied by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Please explain

This category may cause double counting at Vale's scope 1 emission due to the type of contract Vale has with the leased assets, because where Vale has operational control all the GHG emissions are accounted.

Downstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

3.321.110,05

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: quantity of fuel consumption or travelled distance or time spent; vehicle efficiency; quantity of material transported. Emission factors in tonnes of GHG per activity data. Methodology: emissions are calculated using three different approaches. a) Quantity of fuel consumed multiplied by the applicable emission factor; b) estimate the fuel consumption from the travelled distance or time spent and vehicle efficiency and thus calculate the emissions with the quantity of fuel consumed multiplied by the applicable emission factor; c) Quantity of material transported multiplied by the distance (one way, between departure and arrival) and by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Processing of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

533.592.837,7

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Quantity of sold products (iron ore and base metals). Emission factors in tonnes of GHG per activity data. Methodology: Quantity of sold products multiplied by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Use of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

10.681.017,68

Emissions calculation methodology

Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Activity data: Quantity of sold products (coal). Emission factors in tonnes of GHG per activity data. Methodology: Quantity of sold products multiplied by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

End of life treatment of sold products

Evaluation status

Not relevant, explanation provided

Please explain

Not applicable. Vale's products can have numerous different uses and also be recycled. It is not possible to estimate or assume a hypothetical destination to Vale's products to estimate the end life GHG emissions.

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Please explain

Not applicable. Vale does not have any leased assets to account for. Therefore this category is not relevant.

Franchises

Evaluation status

Not relevant, explanation provided

Please explain

Not applicable. Vale does not operate any franchises. Therefore this category is not relevant.

Investments

Evaluation status

Not evaluated

Please explain

Vale intends to estimate investment emissions in 2020, in order to verify whether or not it is relevant to its scope 3.

Other (upstream)

Evaluation status

Please explain

Other (downstream)

Evaluation status

Please explain

C6.7

(C6.7) Are carbon dioxide emissions from biogenic carbon relevant to your organization?

Yes

C6.7a

(C6.7a) Provide the emissions from biogenic carbon relevant to your organization in metric tons CO2.

	CO2 emissions from biogenic carbon (metric tons CO2)	Comment
Row 1	405.703,4	Despite of the relevant decrease in production, the biogenic emissions were slightly below than in 2018 due to increase of the biodiesel share in diesel consumed in Brazil and in Indonesia.

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO2e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0,000335

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)

12.570.529

Metric denominator

unit total revenue

Metric denominator: Unit total

37.570.000.000

Scope 2 figure used

Location-based

% change from previous year

15,9

Direction of change

Decreased

Reason for change

This indicator has decreased by 15,9% mainly due to relevant decrease in GHG emissions (scopes 1 + 2) in 2019 by 14%. The decrease in emissions was mainly due to the production impacts following the Dam I rupture (Brumadinho), such as operational disruption and interdictions, and the stronger than usual weather-related seasonality in 1H19.

Although the drop in this indicator is mainly driven by Brumadinho, Vale had also implemented initiatives to reduce emissions in 2019. For example: Vale's Trip Optimizer-equipped locomotives started operating in 2019 along the Estrada de Ferro Carajás (EFC, the Carajás railroad), which connects Vale's mines in the southeast of Pará State to the Ponta de Madeira Maritime Terminal in Maranhão State. It is a semi-autonomous driving system of the Digital Transformation Program (PTD), aiming to reduce the variability of train operation and improve Energy Efficiency, initially in GE's Evolution fleet (EVO). GE describes Trip Optimizer as "a smart, automated cruise control system that ingests data, analyses route topology and conditions, and creates an optimally fuel-efficient plan, producing fuel savings".

Trip Optimizer enables Vale to increase logistics productivity, and also reduces diesel consumption and GHG emissions. In 2019, the GHG saving was about 7,000 tons of CO₂e.

Thus, 2019 indicator is about 20% lower than 2017 (0.00415 tCO₂e / USD). The net operational revenue was taken from Financial Report of 4Q2019 (IFRS report) at: <http://www.vale.com/EN/investors/information-market/quarterly-results/Pages/default.aspx>

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO ₂ e)	GWP Reference
CO ₂	10.191.168,05	IPCC Fourth Assessment Report (AR4 - 100 year)
CH ₄	624.654,79	IPCC Fourth Assessment Report (AR4 - 100 year)
N ₂ O	428.655,89	IPCC Fourth Assessment Report (AR4 - 100 year)

HFCs	34.023,93	IPCC Fourth Assessment Report (AR4 - 50 year)
SF6	3.731,55	IPCC Fourth Assessment Report (AR4 - 100 year)

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO2e)
Brazil	6.458.498,18
Canada	529.978,3
China	16.526,45
Indonesia	2.042.571,68
Japan	7.284,06
Malaysia	9.529,66
Mozambique	1.033.829,66
New Caledonia	281.614,57
Oman	754.694,95
Paraguay	45.831,18
United Kingdom of Great Britain and Northern Ireland	42.574,46
Other, please specify International (Air space and waters)	59.301,05

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By business division

By facility

C7.3a

(C7.3a) Break down your total gross global Scope 1 emissions by business division.

Business division	Scope 1 emissions (metric ton CO2e)
Ferrous minerals: Iron ore and iron ore pellets, Ferroalloys and manganese	5.268.726,35
Base Metals: Nickel, Copper and other products	3.582.320,98
Logistics Infrastructure: Railways and Ports	1.307.535,73
Coal	1.032.204,84

Others (Aviation, Corporate, Energy - Biopalma, Mineral Research and "Reparação Brumadinho")	91.446,31
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C7.3b

(C7.3b) Break down your total gross global Scope 1 emissions by business facility.

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
Corporative Brazil	97.128,59	-22,910169	-43,173635
Corumbá Complex	16.556,2	-19,187434	-57,607705
Itabira Complex	296.715,71	-19,593315	-43,221606
Mariana Complex	138.333,15	-20,20212	-43,445293
Vargem Grande Complex	143.216,24	-20,236804	-43,864175
Paraopeba Complex	119.713,74	-20,41899	-43,876104
Ferrosos Norte	552.809,91	-6,059807	-50,167448
Serra Sul - S11D	131.176,09	-6,411224	-50,341333
Ponta da Madeira Complex	444.013,72	-2,574198	-44,342135
Tubarão Complex	2.297.760,21	-20,262567	-40,244273
Oman Operations	754.694,95	24,511622	56,598384
Onça Puma	374.818,33	-6,542229	-51,114634
PT Vale Indonesia	2.042.571,68	-2,568121	121,389641
Port Colborne Refinery	15.518,69	42,879598	-79,237737
Sudbury Complex	371.797,96	46,480663	-81,045879
Thompson Complex	19.327,71	55,71292	-97,836879
Long Harbour Operations	41.628,51	47,418623	-53,792404
Voisey's Bay Complex	81.705,44	56,334705	-62,072704
Clydach Refinery	42.574,46	51,693711	-3,889591
Matsuzaka Refinery	7.284,06	34,604467	136,549806
Vale Nouvelle-Calédonie Operations	281.614,57	-22,307823	166,927244
Dalian Refinery	16.526,45	39,026029	121,812161
Salobo	179.386,17	-5,794425	-50,531521
Sossego	107.566,96	-6,433417	-50,069884

Moatize Complex	1.033.829,66	- 16,166062	33,807821
Biopalma	51.020,46	-2,22263	-48,440838
Carajás Railway (EFC)	924.044	-2,56835	-44,346151
Vitória to Minas Railway (EFVM)	352.696,12	-20,27682	-40,246181
Transbarga Navegacion (TBN)	45.831,18	- 25,278819	-57,637724
Barbacena's Ferroalloy Plant	80.772,94	- 21,202882	-43,816482
Ouro Preto's Ferroalloy Plant	22.755,24	- 20,418724	-43,552753
Simões Filho's Ferroalloy Plant	182.085,67	- 12,787931	-38,412447
Malaysia Distribution Center (Teluk Rubiah)	9.529,66	4,170708	100,619682
Ilha de Guaíba's Terminal (TIG)	4.651,46	- 23,004488	-44,032523
Itaguaí's Terminal (CPBS)	578,32	- 22,910695	-43,819408

C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4

(C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4) Break down your organization's total gross global Scope 1 emissions by sector production activity in metric tons CO₂e.

	Gross Scope 1 emissions, metric tons CO ₂ e	Comment
Metals and mining production activities	8.745.721,72	Emissions excluded: logistic services, coal and energy operations, and corporate offices.

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO ₂ e)	Scope 2, market-based (metric tons CO ₂ e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted for in Scope 2 market-based approach (MWh)
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Brazil	578.679,1	54.671,93	7.715.644,2	6.986.762,33
Canada	33.781,23	33.781,23	1.816.080,03	0
China	33.690,41	33.690,41	51.011	0
Indonesia	2.683,58	2.683,58	3.643,25	0
Japan	8.298,79	8.298,79	15.301	0
Malaysia	53.623,97	53.623,97	77.744,21	0
Mozambique	17.642,93	17.642,93	272.688,29	0
New Caledonia	249.104,81	249.104,81	276.617,42	0
Oman	301.609,45	301.609,45	591.836,79	0
Paraguay	0,01	0,01	122,93	0
United Kingdom of Great Britain and Northern Ireland	9.180,43	9.180,43	35.918,62	0

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By business division

By facility

C7.6a

(C7.6a) Break down your total gross global Scope 2 emissions by business division.

Business division	Scope 2, location-based (metric tons CO ₂ e)	Scope 2, market-based (metric tons CO ₂ e)
Ferrous minerals: Iron ore and iron ore pellets, Ferroalloys and manganese	698.914,81	352.180,15
Base Metals: Nickel, Copper and other products	473.103,6	336.739,25
Logistics Infrastructure: Railways and Ports	97.887,49	57.421,35
Coal	17.642,93	17.642,93
Others (Aviation, Corporate, Energy - Biopalma, Mineral Research and "Reparação Brumadinho")	745,89	303,86

C7.6b

(C7.6b) Break down your total gross global Scope 2 emissions by business facility.

Facility	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Corporative Brazil	597,83	155,81
Corumbá Complex	1.259,05	1.259,05
Itabira Complex	112.301,23	0
Mariana Complex	31.509,48	0
Vargem Grande Complex	14.073,06	0
Paraopeba Complex	8.888,97	0
Ferrosos Norte	36.085,65	0
Serra Sul - S11D	18.699,89	0
Ponta da Madeira Complex	38.779,33	0
Tubarão Complex	124.032,65	0
Oman Operations	301.609,45	301.609,45
Onça Puma	43.965,05	0
PT Vale Indonesia	2.683,58	2.683,58
Port Colborne Refinery	490,38	490,38
Sudbury Complex	20.497,68	20.497,68
Thompson Complex	0	0
Long Harbour Operations	12.793,17	12.793,17
Voisey's Bay Complex	0	0
Clydach Refinery	9.180,43	9.180,43
Matsuzaka Refinery	8.298,79	8.298,79
Vale Nouvelle-Calédonie Operations	249.104,81	249.104,81
Dalian Refinery	33.690,41	33.690,41
Salobo	70.083,94	0
Sossego	22.315,35	0
Moatize Complex	17.642,93	17.642,93
Biopalma	148,05	148,05
Carajás Railway (EFC)	722,43	722,43
Vitória to Minas Railway (EFVM)	3.074,95	3.074,95
Transbarga Navegacion (TBN)	0,01	0,01
Barbacena's Ferroalloy Plant	17.721,13	17.721,13
Ouro Preto's Ferroalloy Plant	4.430,45	4.430,45

Simões Filho's Ferroalloy Plant	27.160,04	27.160,04
Malaysia Distribution Center (Teluk Rubiah)	53.623,97	53.623,97
Ilha de Guaíba's Terminal (TIG)	2.075,39	0
Itaguaí's Terminal (CPBS)	755,14	0

C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7

(C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7) Break down your organization's total gross global Scope 2 emissions by sector production activity in metric tons CO₂e.

	Scope 2, location-based, metric tons CO ₂ e	Scope 2, market-based (if applicable), metric tons CO ₂ e	Comment
Metals and mining production activities	1.171.910,71	688.655,89	Emissions excluded: logistic services, coal and energy operations, and corporate offices.

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Decreased

C7.9a

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined), and for each of them specify how your emissions compare to the previous year.

	Change in emissions (metric tons CO ₂ e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	0	No change	0	No change in emissions.
Other emissions	64.044	Decreased	0,45	Change due to emission reductions initiatives as reported in question C4.3b. Calculation: (64,044/14,084,000)*100 =

reduction activities				0.45%
Divestment	0	No change	0	No change in emissions.
Acquisitions	0	No change	0	No change in emissions.
Mergers	0	No change	0	No change in emissions.
Change in output	1.449.663	Decreased	10,29	"Aggregated changes in productivity and production profiles, contributed to the remainder of the change in emissions from FY2017 to FY2019. Calculation: $(1,449,663/14,084,000)*100 = 10.3\%$ Decline and production and organic growth explains the variation in production and emissions: (i) operational disruption which followed the Dam I rupture (Brumadinho); (ii) activities partially suspended in Onça Puma plant (iii) S11D, São Luís pellet plant and Moatize coal operations ramp-ups."
Change in methodology	0	No change	0	No change in emissions.
Change in boundary				
Change in physical operating conditions				
Unidentified	0	No change	0	No change in emissions.
Other				

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 10% but less than or equal to 15%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertook this energy-related activity in the reporting year
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	No
Generation of electricity, heat, steam, or cooling	Yes

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	LHV (lower heating value)	1.427.606,72	30.521.227,94	31.948.834,66
Consumption of purchased or acquired electricity		7.864.538,46	2.997.477,84	10.862.016,3

Consumption of self-generated non-fuel renewable energy		2.663.473,38		2.663.473,38
Total energy consumption		11.955.618,56	33.518.705,78	45.474.324,34

C-MM8.2a

(C-MM8.2a) Report your organization's energy consumption totals (excluding feedstocks) for metals and mining production activities in MWh.

	Heating value	Total MWh
Consumption of fuel (excluding feedstocks)	LHV (lower heating value)	24.978.890,8
Consumption of purchased or acquired electricity		9.904.569,56
Consumption of self-generated non-fuel renewable energy		2.663.473,38
Total energy consumption		37.546.933,74

C8.2b

(C8.2b) Select the applications of your organization's consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	Yes
Consumption of fuel for the generation of cooling	No
Consumption of fuel for co-generation or tri-generation	Yes

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Fuels (excluding feedstocks)

Biodiesel

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

1.152.359,08

MWh fuel consumed for self-generation of electricity

30.273,42

MWh fuel consumed for self-generation of heat

1.120.241,26

MWh fuel consumed for self-generation of steam

1.844,4

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

70,77

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

The value of the column "MWh consumed self-generation or self-generation" refers to Biopalma in the biomass steam generator turbo.

Fuels (excluding feedstocks)

Biogasoline

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

6.182,77

MWh fuel consumed for self-generation of electricity

0,22

MWh fuel consumed for self-generation of heat

6.182,55

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

70,77

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Diesel

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

11.988.054,01

MWh fuel consumed for self-generation of electricity

370.826,29

MWh fuel consumed for self-generation of heat

11.479.718,59

MWh fuel consumed for self-generation of steam

137.509,13

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

74,07

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Jet Kerosene

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

38.417,73

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

38.417,73

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

71,5

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Kerosene

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

2.637,16

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

2.637,16

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

71,87

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Liquefied Petroleum Gas (LPG)

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

203.814,11

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

203.814,11

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

63,07

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Motor Gasoline

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

27.296,78

MWh fuel consumed for self-generation of electricity

0,86

MWh fuel consumed for self-generation of heat

27.295,92

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

69,3

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Natural Gas

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

7.015.391,24

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

6.967.186,02

MWh fuel consumed for self-generation of steam

48.205,22

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

56,1

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Propane Gas

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

38.679,17

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

38.679,17

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

63,07

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Wood

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

269.064,87

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

269.064,87

Emission factor

111,83

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Coke

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

108.669,55

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

108.669,55

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

107,07

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2: Energy > Chapter 1: Introduction. TABLE 1.3. DEFAULT VALUES OF CARBON CONTENT

Comment

Fuels (excluding feedstocks)

Light Distillate

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

13.289,64

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

13.289,64

MWh fuel consumed for self-generation of steam

25.711,04

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

70,22

Unit

kg CO2 per GJ

Emissions factor source

NIR 2019. National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada. Part 2 - Table A4-2 Reference Approach Energy Conversion and Emission Factors for Canada.

Comment

Fuels (excluding feedstocks)

Marine Fuel Oil

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

723.497

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

723.497

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

77,46

Unit

kg CO2 per GJ

Emissions factor source

IMO, Third GHG Study 2014 - Table 34 – Emissions factors for top-down emissions from combustion of fuels.

Comment

Fuels (excluding feedstocks)

Anthracite Coal

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

4.643.329,63

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

4.643.329,63

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

98,27

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Coal

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

2.526.928,31

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

2.526.928,31

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

94,6

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

Fuels (excluding feedstocks)

Residual Fuel Oil

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

2.387.509,57

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

2.387.509,57

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

77,37

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2: Energy > Chapter 1: Introduction. TABLE 1.3. DEFAULT VALUES OF CARBON CONTENT

Comment

Fuels (excluding feedstocks)

Other, please specify

Residual Fuel Oil (Óleo Combustível Brasil)

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

803.714,04

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

803.714,04

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Emission factor

77,37

Unit

kg CO2 per GJ

Emissions factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2: Energy > Chapter 1: Introduction. TABLE 1.3. DEFAULT VALUES OF CARBON CONTENT

Comment

C8.2d

(C8.2d) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	2.792.383,77	2.792.383,77	2.688.734,69	2.688.734,69
Heat	31.065.399,21	31.065.399,21	1.126.423,81	1.126.423,81

Steam	213.269,79	213.269,79	1.844,4	1.844,4
Cooling	0	0	0	0

C-MM8.2d

(C-MM8.2d) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed for metals and mining production activities.

	Total gross generation (MWh) inside metals and mining sector boundary	Generation that is consumed (MWh) inside metals and mining sector boundary
Electricity	2.767.122,47	2.767.122,47
Heat	24.377.546,41	24.377.546,41
Steam	213.269,79	213.269,79
Cooling	0	0

C8.2e

(C8.2e) Provide details on the electricity, heat, steam, and/or cooling amounts that were accounted for at a zero emission factor in the market-based Scope 2 figure reported in C6.3.

Sourcing method

Power purchase agreement (PPA) with a grid-connected generator with energy attribute certificates

Low-carbon technology type

Hydropower

Country/region of consumption of low-carbon electricity, heat, steam or cooling

Latin America (LATAM)

MWh consumed accounted for at a zero emission factor

6.986.762,33

Comment

Scope 2 emissions in 2019, accounted by the Market Based methodology, totalled 0.76 million tCO₂e. These emissions, unlike the accounting by the Location methodology, consider Vale's energy acquisition contracts as well as concession contracts for its own assets, attesting their renewable origin through certificates or declarations from generators. In 2019, from the total energy contracted and consumed via GRID, by Vale's operations in Brazil, we deducted a total of 7 TWh, from renewable sources.

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

Description

Energy usage

Metric value

0,26

Metric numerator

11.955.618,56

Metric denominator (intensity metric only)

45.474.324,34

% change from previous year

4

Direction of change

Decreased

Please explain

The small variation in the share of renewables in 2019 when compared to 2018, is justified by the reduction in energy consumption, especially in Brazil, which brings an important share of renewables in its consumption. This consumption reduction is due to the impact of the shutdowns in the mines and pelletizers in Minas Gerais, due to the rupture of Dam I of the Córrego do Feijão mine, in addition to other dams in the process of being de-characterized. In addition, the continuity of the ramp ups at the São Luís plant, a plant based on fuel oil in Brazil, and the opening of new sessions at the Moatize Coal Mines, in Mozambique, increased the consumption of non-renewable energy sources.

Formula = $RE / (RE + NR)$, where RE: renewable energy and NR: non-renewable energy consumed."

C-MM9.3a

(C-MM9.3a) Provide details on the commodities relevant to the mining production activities of your organization.

Output product

Copper

Capacity, metric tons

290.000

Production, metric tons

284.800

Production, copper-equivalent units (metric tons)

284.800

Scope 1 emissions

286.953,13

Scope 2 emissions

92.399,3

Scope 2 emissions approach

Location-based

Pricing methodology for copper-equivalent figure

Copper conversion factor for the calculation of the copper-equivalent figure: Copper average price divided by copper average price for the period of 2017 to 2019 = 1.000

Comment

Copper concentrate operations from Brazilian operations (Salobo and Sossego).

Output product

Iron ore

Capacity, metric tons

413.070.000

Production, metric tons

301.972.000

Production, copper-equivalent units (metric tons)

4.833.688

Scope 1 emissions

4.863.019,49

Scope 2 emissions

648.195,15

Scope 2 emissions approach

Location-based

Pricing methodology for copper-equivalent figure

Iron ore conversion factor for the calculation of the copper-equivalent figure: Iron ore and pellets average price divided by copper average price for the period of 2017 to 2019 = 0.0160

Comment

Output product

Other mining (Please specify)
Manganese ore

Capacity, metric tons

4.850.000

Production, metric tons

1.576.000

Production, copper-equivalent units (metric tons)

Scope 1 emissions

16.713,11

Scope 2 emissions

1.408,48

Scope 2 emissions approach

Location-based

Pricing methodology for copper-equivalent figure

Comment

It includes the GHG emissions from Mina do Azul and Morro da Mina. It is not possible to desegregate the emissions from Urucum Mine (which produces iron and manganese ore), then its emissions were allocated to iron ore.

C-MM9.3b

(C-MM9.3b) Provide details on the commodities relevant to the metals production activities of your organization.

Output product

Nickel

Capacity (metric tons)

355.000

Production (metric tons)

208.000

Annual production in copper-equivalent units (thousand tons)

469.956

Scope 1 emissions (metric tons CO2e)

3.295.367,85

Scope 2 emissions (metric tons CO2e)

380.704,31

Scope 2 emissions approach

Location-based

Pricing methodology for-copper equivalent figure

Nickel conversion factor for the calculation of the copper-equivalent figure: Nickel refined average price divided by copper average price for the period of 2017 to 2019 = 2.2594

Comment

It includes the emissions from Nickel operations and its coproducts (metallic copper, cobalt, PGM).

Output product

Other ferrous metals (Please specify)
Manganese ferroalloys

Capacity (metric tons)

265.000

Production (metric tons)

151.000

Annual production in copper-equivalent units (thousand tons)

31.910

Scope 1 emissions (metric tons CO2e)

283.668,14

Scope 2 emissions (metric tons CO2e)

49.203,48

Scope 2 emissions approach

Location-based

Pricing methodology for-copper equivalent figure

Manganese ferroalloys conversion factor for the calculation of the copper-equivalent figure: Ferroalloys average price divided by copper average price for the period of 2017 to 2019 = 0.2113

Comment

C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6

(C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6) Does your organization invest in research and development (R&D) of low-carbon products or services related to your sector activities?

	Investment in low-carbon R&D	Comment
Row 1	Yes	<p>The investment in research and development represents a crucial risk mitigation strategy and a substantial opportunity, generating the development of new technologies capable of increasing productivity and decreasing GHG emissions. Vale unveiled an investment of US\$ 2 Billion to reduce Carbon Emissions within the Next Ten Years to reduce its direct and indirect absolute emissions (scopes 1 and 2) by 33% by 2030.</p> <p>Vale consider the opportunity to change its energy matrix in the process of defining the sustainability strategy. One opportunity consists in adapting to climate change considering R&D investments. For example, Vale created the Center for Advanced Climate Studies in partnership with the Espírito Santo Government and the University of Espírito Santo. The center, which is already in operation, has the objective of conducting climate-related researches that will assist the state, the country and Vale itself to better understand the climate change issues and how to deal with them. Another example is the Vale Technological Institute (ITV), founded in 2009, that is developing low carbon and clean/renewable energy R&D and products. This institute has a dedicated group of researches focused on climate change that seeks to understand the science of climate change and to develop new technologies in order for Vale to better adapt to the new low-carbon economy. The Institute's agenda focuses on biodiversity, environmental services, water resources, environmental genomics, reforestation with native species, recovery of degraded areas, climate change, occupation and use of land and socioeconomics. In addition to research, ITV is involved in training people through the professional Sustainable Use of Natural Resources in</p>

		Tropical Regions master's program. Throughout the year, ITV contributed a total of \$10 million dollars invested in 17 research initiatives with projects that contribute to biodiversity knowledge and conservation. The main technologies that are being developed by Vale to reduce emissions for example: Primetals (Maximizing the use of scrap), TecnoRed (Replacement by biomass reducer), SuSteel (Hydrogen-based metallurgy), etc.
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C-MM9.6a

(C-MM9.6a) Provide details of your organization's investments in low-carbon R&D for metals and mining production activities over the last three years.

Technology area	Stage of development in the reporting year	Average % of total R&D investment over the last 3 years	R&D investment figure in the reporting year (optional)	Comment
Other, please specify Logistics, pelletizing & environment	Applied research and development	≤20%	1.800.000	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. In 2019, 21 research and development (R&D) projects were approved, which represent a financial contribution of \$1.8 million dollars. Among the projects approved, 5 are related to Logistics (US\$ 0.4 million), 2 to Pelletizing (US\$0.2 million), and 14 to the Environment (US\$1.2 million). The approved projects aim to contribute to the advancement and application of scientific and technological knowledge.

<p>Unable to disaggregate by technology area</p>		<p>81 - 100%</p>	<p>10.000.000</p>	<p>Vale is consistently focused on improving its processes throughout research and development (R&D) projects. Vale Technological Institute (ITV), founded in 2009, is developing low carbon and clean/renewable energy R&D and products. This institute has a dedicated group of researches focused on climate change that seeks to understand the science of climate change and to develop new technologies in order for Vale to better adapt to the new low-carbon economy. The Institute's agenda focuses on biodiversity, environmental services, water resources, environmental genomics, reforestation with native species, recovery of degraded areas, climate change, occupation and use of land and socioeconomics. In addition to research, ITV is involved in training people through the professional Sustainable Use of Natural Resources in Tropical Regions master's program. So far, 85 masters have graduated, 45% of whom are Vale professionals. In 2019, ITV created the Resident Master's Student Program with the purpose of boosting and influencing local professionals' training on topics related to the 17 Sustainable Development Goals (SDGs), offering ten scholarships. Throughout the year, ITV contributed a total of \$10 million dollars invested in 17 research initiatives with projects that contribute to biodiversity knowledge and conservation.</p>
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C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	Third-party verification or assurance process in place

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements.

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

 VALE-2019-38538-V01-CDP_EN_2020.pdf

Page/ section reference

Pages 1 and 2

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.1b

(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 2 emissions and attach the relevant statements.

Scope 2 approach

Scope 2 location-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

 VALE-2019-38538-V01-CDP_EN_2020.pdf

Page/ section reference

Pages 1 and 2

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.1c

(C10.1c) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.

Scope 3 category

Scope 3 (upstream & downstream)

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

 VALE-2019-38538-V01-CDP_EN_2020.pdf

Page/section reference

Pages 1 and 2

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

Yes

C10.2a

(C10.2a) Which data points within your CDP disclosure have been verified, and which verification standards were used?

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C4. Targets and performance	Emissions reduction activities	GRI Sustainability Reporting Standards and International Standard on Assurance Engagements (ISAE) 3000	SGS was hired by Vale SA to perform the limited and independent assurance of its 2019 Sustainability Report and Greenhouse Gas Emissions Inventory. The assurance scope, based on the SGS Sustainability Reporting methodology, included the text and data related to the GRI Standards and International Standard on Assurance Engagements (ISAE) for the year 2019. The assurance process was comprised a combination of visits to Vale's business units, which reviewed disclosures data, and processes related to sustainability management and the collection of GRI disclosures, as well as interviews with strategic collaborators, followed by operational processes, review the documentation submitted by Vale and comparison with the information by the company in the Credit 360 disclosure collection system.

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

Yes

C11.1a

(C11.1a) Select the carbon pricing regulation(s) which impacts your operations.

Canada federal fuel charge

Japan carbon tax

C11.1c

(C11.1c) Complete the following table for each of the tax systems you are regulated by.

Canada federal fuel charge

Period start date

janeiro 1, 2019

Period end date

dezembro 31, 2019

% of total Scope 1 emissions covered by tax

4,7

Total cost of tax paid

97.110,74

Comment

The federal government of Canada is charging USD\$15/tCO₂e. We paid carbon tax on fuel supplies early on in the process where the exemption certificate hadn't been provided yet and obtained a refund (US\$29.735,26) on those amounts from Canada Revenue Agency (CRA).

Japan carbon tax

Period start date

janeiro 1, 2019

Period end date

dezembro 31, 2019

% of total Scope 1 emissions covered by tax

0,06

Total cost of tax paid

15.230

Comment

Japanese Carbon Tax take the form of a surcharge over existing oil and coal taxes, and it is included in the purchase price of these fuels.

The tax was designed that JPY 289 was imposed on 1 ton of carbon dioxide emitted.

The tax rate was set at a low level at first and then gradually raised in three stages - October 2012, April 2014 and April 2016.

C11.1d

(C11.1d) What is your strategy for complying with the systems you are regulated by or anticipate being regulated by?

Vale recognizes the risks and opportunities imposed by carbon pricing schemes, and in order to minimize the risks and maximize opportunities, we have a Policy Global Mitigation and Adaptation to Climate Change. This policy describes the guidelines on the subject, encompassing commitments to manage and reduce GHG emissions from the company. Some compliance options include strategies for establishing an internal carbon price, which starts from renewable sources, energy efficiency and biofuels and ends with electrification technology and innovation.

In 2019, the company published a group of sustainability goals (link to the governance part - goals), including new commitments to reduce greenhouse gas (GHG) emissions, bolder than goals established previously in 2018, aiming to become a carbon neutral mining company.

- To reduce the absolute emission of scopes 1 and 2 in 2030, aligned with the Paris Agreement¹⁹;
- To become carbon neutral (scope 1 and 2) by 2050;
- To adopt a shadow price of USD 50 per ton of CO₂ equivalent, to be used in the economic feasibility studies of projects;
- To adopt a shadow price of USD 10 a ton of CO₂ equivalent for carbon sequestration in forest restoration and reforestation projects;
- To adopt a target for scope 3 emissions.

The Low Carbon Forum was also created to manage the implementation of the Vale Carbon Neutral strategy. The Forum is coordinated by the Sustainability Executive Board with the support of the Executive Boards: Coal, Strategy and Mineral Exploration, Business Support, Ferrous, Basic Metals and with the participation of Vale's CEO. The meetings are held monthly with the participation of the broad leadership and technical teams that deal with the topic on a day-to-day basis. Vale's goal is, throughout the climate change management process, to develop a portfolio of low carbon projects made possible by the internal carbon price, in addition to a better understanding of regulatory risks and their impacts; better understand and communicate material risks and opportunities for climate change in business; change Vale's energy consumption matrix through higher consumption of renewable energy sources; and reduce the carbon footprint of their products.

We also have created an internal program called PowerShift to support its sustainability goals, focusing on the transition to a low-carbon economy. The program aims to make the Company's

energy matrix clean by focusing on the use of renewable energy and alternative fuels, greater efficiency of operations using new technologies, and forest promotion. PowerShift-linked initiatives are expected to contribute approximately 40% of Vale's planned reductions to help us reach the United Nations 2030 Agenda target.

In addition to the company's global strategy for promoting and adopting the internal price of carbon, a strategy to reduce the impacts of carbon taxation in Canada is the "Green Energy Vehicle Program". Throughout 2019 and 2020 we have accepted delivery of numerous battery electric vehicles within North Atlantic's underground operations. These vehicles are being trialed across a number of operations to provide learnings and diversified feedback to the business. By the end of 2020 we expect to have over twenty battery powered vehicles operating as a part of the Green Energy Vehicle trial program. Key operating and performance metrics will be collected, tracked and shared throughout the trial phase to expedite the validation of this technology and to improve our internal understanding of its impacts on the business. We expect to see a decrease in diesel fuel consumption as our fleet transitions to alternative energy sources as a part of this program, for example, Creighton mine, that is home to the largest fleet of battery electric vehicles within Vale as it is recognized as the GEV pilot project.

C11.2

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

No

C11.3

(C11.3) Does your organization use an internal price on carbon?

Yes

C11.3a

(C11.3a) Provide details of how your organization uses an internal price on carbon.

Objective for implementing an internal carbon price

Navigate GHG regulations

Stakeholder expectations

Change internal behavior

Drive energy efficiency

Drive low-carbon investment

Other, please specify

Understand the exposure to risk and the impact on the cost of the Company

GHG Scope

Scope 1

Scope 2

Application

Vale has adopted an internal carbon price (shadow price) of USD 50 per ton of CO2 equivalent, to be used in the economic feasibility studies and a shadow price of USD 10 a ton of CO2 equivalent for carbon sequestration in forest restoration and reforestation projects of projects.

Pricing carbon means attributing a cost to the impacts generated by the increase in greenhouse gases (GHG) in the atmosphere resulting from Vale's new projects and investments. For this, it is necessary that the projects account for their GHG emissions, incorporate the estimated carbon cost and present the results for validation of the project.

Actual price(s) used (Currency /metric ton)

50

Variance of price(s) used

From USD 10.00 to 50.00

Type of internal carbon price

Shadow price

Impact & implication

Throughout 2019 Vale has developed a proprietary carbon pricing model to assess risks linked to climate change, by projecting possible impacts on the operating costs of each business unit. This model was officially implemented on June 1, 2020 and takes into account the impacts on direct and indirect costs, including impacts on the supply chain. All project/investments that have a GHG emission associated to its operation and/or will be responsible for the deforestation of native forest during its implantation will estimate its GHG emission and incorporate the shadow price for the project/investment evaluation and approval.

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers

Yes, other partners in the value chain

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Compliance & onboarding

Details of engagement

Included climate change in supplier selection / management mechanism

% of suppliers by number

40

% total procurement spend (direct and indirect)

65,79

% of supplier-related Scope 3 emissions as reported in C6.5

2,67

Rationale for the coverage of your engagement

Our suppliers are managed according to the same compliance standards that are upheld within the Company with respect to social and environmental safety and ethics and integrity aspects.

At the stage of registering new suppliers, Vale's main compliance initiatives are: Supplier Code of Ethics and Conduct, Global Anti-Corruption Program, Third-Party Due-Diligence, Environmental Licenses and Legal Requirements and Health and Safety Evaluation, to manage risks and provide greater security and confidence to our shareholders in relation to our choice of suppliers.

Since 2011, we have encouraged our value chain in emissions management, through a contractual clause and the application of an annual questionnaire on Greenhouse Gases (GHG).

Impact of engagement, including measures of success

Vale is committed to making its suppliers aware of the issue of climate change and engaging them in improving the management of their emissions. Vale is also establishing a goal for scope 3 to encourage clients and suppliers in the same direction. Through active engagement with clients from the steel and metallurgy industries, Vale is working to reduce emissions in its value chain.

The company is guiding its operations based on win-win relationships, less intensive products, and new technologies.

Measuring success: Among the initiatives already implemented we can highlight the inclusion of contractual clauses related to greenhouse gas management for suppliers.

An example of engagement impact is from 2020, five hundred Vale suppliers, considered essential in terms of emissions in the supply chain, will be invited annually to participate in the CDP Supply Chain program.

Comment

Scope 3 emissions, indirect GHG emissions calculated along the value chain, include up-stream emissions (related to goods and services purchased or acquired) and downstream emissions (related to goods and services sold). In 2019, these emissions totalled approximately 563 million tCO₂e in the year, a result 4% lower than in 2018. Around 97% of these down-stream emissions are due to the processing and use of products sold by Vale.

Type of engagement

Information collection (understanding supplier behavior)

Details of engagement

Collect climate change and carbon information at least annually from suppliers

% of suppliers by number

1

% total procurement spend (direct and indirect)

24

% of supplier-related Scope 3 emissions as reported in C6.5

37

Rationale for the coverage of your engagement

In adherence to Vale's Global Climate Change Policy was created the Carbon Program in the Value Chain. Initially, the program involved the training of suppliers to prepare an inventory of GHG emissions. Nowadays provides for the annual reporting commitment of GHG emissions from suppliers critical to Vale, as well as other information on emission management. This commitment is formalized through the insertion of a voluntary clause in contracts signed in Brazil. The program is aimed at companies from any region, provided they have active contracts with Vale.

The engagement campaign carried out in 2018 had the greatest result since its inception and inventories of 193 factories were received, as a consequence of the category managers' engagement and the factor's awareness of the importance of the theme and its impacts on the Supply chain. From 2020, five hundred Vale suppliers, considered essential in terms of emissions in the supply chain, will be invited annually to participate in the CDP Supply Chain program.

The value of 37% from "% of supplier-related Scope 3 emissions as reported in C6.5" was defined by Vale's supply chain management from an emission criticality analysis.

Impact of engagement, including measures of success

Vale depends on its supply chain. From railroad tracks to outsourcing, supply management permeates Vale's entire production chain and is strategic to our business. We share with our suppliers the values that guide our actions, such as the priority to life, caring for the planet and valuing people. Our suppliers are managed according to the same compliance standards that are upheld within the Company with respect to social and environmental safety and ethics and integrity aspects.

Measuring success: Vale is committed to making its suppliers aware of the issue of climate change and engaging them in improving the management of their emissions, and define a goal to reduce scope 3 emissions.

An example of engagement impact is align the business portfolio to the transition to a low carbon economy, leveraging new business opportunities. The relevant initiative is our engagement with the International Maritime Organization (IMO) goals. Along with that, Vale has used its influence with partners to identify strategic opportunities to

implement projects with the potential to achieve more material emissions reductions, such as the charter of 30 Valemax 2G and 47 Guaibamax ships, which reduce emissions by 41% and 38%, respectively, when compared to previously used vessels.

Comment

C12.1d

(C12.1d) Give details of your climate-related engagement strategy with other partners in the value chain.

Vale constantly monitors the discussions of IMO’s Marine Environment Protection Committee (MEPC) on GHG emissions and engages the Brazilian Government and Navy to support its technical analysis related to the issue. An energy-efficiency index and goal-based technical and operational measures are amongst the proposals Vale supports in order to achieve IMO’s 2030 and 2050 goals.

On the technical side, Vale has used its influence with partners to identify strategic opportunities to implement projects with the potential to achieve more material emissions reductions, such as the charter of 30 Valemax 2G and 47 Guaibamax ships, which reduce emissions by 41% and 38%, respectively, when compared to previously used vessels. Vale also engages several R&D partnerships aimed at evaluating options for vessel efficiency gains and reducing GHG emissions. Such initiatives include partnerships with universities, research institutions, classification societies, suppliers, owners, joint projects with industry stakeholders, and open innovation programs that bring us in contact with the start-up community, fostering our innovation efforts even more. Exploring new technologies and investing in both R&D and mature solutions with high potential is crucial to understand our options and incentivize the broader community on the uptake of sustainable solutions. Our current pipeline of R&D projects counts with almost 20 initiatives ranging from conceptual designs to pilots. Wind Assisted Propulsion, active and passive hull resistance reduction, energy saving devices, waste heat recovery, alternative fuels - from production to power generation and carbon capture and storage, are some of the topics currently being addressed.

C12.3

(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?

- Direct engagement with policy makers
- Trade associations
- Funding research organizations

C12.3a

(C12.3a) On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
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<p>Other, please specify Brazilian Carbon Pricing</p>	<p>Support</p>	<p>In 2016, the Ministry of Treasure continued the Partnership for Market Readiness, a World Bank’s initiative, to develop technical studies on feasible carbon pricing mechanisms and their impacts on the economy. Vale is working together with the government, business organizations and civil society to develop those analyses. Vale continued to support the academic initiative on simulating an emission trading scheme in Brazil (“Empresas Pelo Clima” initiative). Vale also contributed to the public consultation of documents released by the government regarding the implementation of Brazilian NDC. Vale signed a position paper in favour of a carbon pricing to help contain global warming.</p>	<p>Vale supports the initiative with no exceptions.</p>
<p>Other, please specify IMO strategy for reducing GHG</p>	<p>Support</p>	<p>Vale has been supporting the Brazilian Government/Navy with an analysis of IMO MEPC (Marine Protection Committee) technical proposals related to GHG emissions of international shipping, which could turn to decisions and/or regulations.</p>	<p>Vale supports proposals focused on energy efficiency and climate goals to the achievement of the IMO GHG emissions reductions targets.</p>
<p>Mandatory carbon reporting</p>	<p>Support</p>	<p>MRV (Measurement, Reporting, and Verification) at IMO: Vale has been supporting the Brazilian Government/Navy with an analysis of IMO MEPC (Marine Protection Committee) technical proposals related to GHG emissions of international shipping, which could turn to decisions and/or regulations. For example, Vale analysed the documents regarding the establishment of a global data collection system for either a mandatory or voluntary application of the system for collection of fuel consumptions, monitoring CO2 emissions from ships and possible verifying by the flag States.</p>	<p>Vale supports the establishment of a mandatory report of fuel consumptions from ships.</p>

<p>Other, please specify</p> <p>Canada Federal Carbon Pricing</p> <p>1</p>	<p>Support with minor exceptions</p>	<p>Vale has participated in all engagements with the federal government arguing against the criteria used to assess carbon leakage, and the specific thresholds on GHG intensity for mining/milling, smelting/refining and electricity generation. Vale has produced an internal white-paper that discusses the cost-impact from the Backstop program and has presented its position to Environment and Climate Change Canada (ECCC) arguing against the proposed clauses in the Backstop program.</p>	<p>Vale broadly supports the program but with key exceptions on proposed GHG intensity thresholds. ECCC has stated that it might consider increasing the GHG intensity thresholds. Discussions on the proposed legislation are still on-going.</p>
<p>Other, please specify</p> <p>Cancellation Ontario CaT</p> <p>2</p>	<p>Oppose</p>	<p>In June 2018, the new provincial government in Ontario scrapped the Cap and Trade program which started in 2017. Vale is against this decision and has lobbied with The Ontario Mining Association (OMA) to voice their concerns against the provincial government's decision. Vale has assessed that removing Cap and Trade could mean the implementation of the Federal Backstop program which would cost Vale significantly more in carbon pricing.</p>	<p>Vale is still waiting on any new developments from the provincial government on carbon pricing. To date, the Ontario government has suggested fighting the Backstop program in courts, if it were to be implemented in Ontario.</p>
<p>Cap and trade</p>	<p>Support</p>	<p>Manitoba Cap-and-trade: Manitoba is planning to implement a flat carbon price of \$25 per tonne CO₂e.</p>	<p>Vale is still waiting on developments on how mining/milling in Thompson would be affected by the proposed plan. The decommissioning of the Smelter would likely generate credits to overcome some of the carbon costs in Manitoba.</p>
<p>Other, please specify</p> <p>Newfoundland and Labrador – GHG Act</p> <p>3</p>	<p>Support</p>	<p>A made in Newfoundland and Labrador carbon pricing framework is being developed by the provincial government.</p>	<p>Vale is still waiting on specific developments by the government of Newfoundland and Labrador.</p>

Other, please specify TCFD	Support	Vale signed the approval of the Task Force on Climate Related Financial Disclosure as an earlier player.	Vale supports the Task Force on climate related financial disclosure and is working to align internal management to the guidelines and framework.
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¹Federal Backstop Program on Carbon Pricing

²Cancellation of the Ontario Cap-and-trade program

³Newfoundland and Labrador Carbon pricing – Greenhouse Gas Act

C12.3b

(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?

Yes

C12.3c

(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.

Trade association

IBRAM

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association’s position

Analyse the impacts of national and international regulation on the extractive sector.

How have you influenced, or are you attempting to influence their position?

Vale supports some technical studies developed by IBRAM and share technical information about GHG emissions of the mining industry. We contribute with discussions about GHG emissions management and abatement opportunities.

Trade association

Brazilian National Confederation of Industry (Confederação Nacional da Indústria –CNI)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association’s position

CNI has been following up on the Brazilian Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) and

interacting with the government both regarding the international commitment and how it will be implemented domestically, particularly on aspects concerning the industry sector.

How have you influenced, or are you attempting to influence their position?

Vale is an active participant of CNI'S working group (Rede Clima) and as such take part in discussions and can provide inputs to the position papers and discussions.

Trade association

Mining Association of Canada

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Participate in government consultation regarding national environmental regulations.

How have you influenced, or are you attempting to influence their position?

Vale has a member on the board and also provides technical assistance due to its expertise.

Trade association

Ontario Mining Association - OMA (Canada)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

OMA has been an active participant in the multi-sectoral consultations with the Ministry of Environment in the development of Ontario GHG reporting regulations and the ongoing development of Ontario's Cap and Trade regulation to reduce GHG emissions.

How have you influenced, or are you attempting to influence their position?

Vale has a member on the board and also provides technical assistance due to its expertise.

Trade association

Canadian Manufacturers and Exporters Association (CME)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The CME is actively involved in lobbying the Canadian government and relevant bodies mainly on the development of legislation and policy. The main areas of focus are climate

change and the impacts of policy and legislation on the sustainability of manufacturers and exporters.

How have you influenced, or are you attempting to influence their position?

Vale provides technical assistance due to its expertise. In particular, Vale has supported the Ontario Section Environment Committee.

Trade association

Association of Major Power Consumers of Ontario (AMPCO)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

AMPCO's objective is industrial electricity rates that are competitive, fair and efficient. It provides clear communications and effective advocacy on cap and trade regulation.

How have you influenced, or are you attempting to influence their position?

Vale has a member on the board and also provides technical assistance due to its expertise.

Trade association

Industrial Gas Users' Association (IGUA)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Industrial Gas Users Association, (IGUA) provides a coordinated and effective public policy and regulatory voice for its members at both the provincial and federal levels. Its focus has been on the cap and trade impacts to natural gas pricing relative to other jurisdictions.

How have you influenced, or are you attempting to influence their position?

Vale has a member on the board and also provides technical assistance due to its expertise.

Trade association

International Association of Dry Cargo Shipowners (INTERCARGO)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

INTERCARGO is involved in IMO discussions concerning the IMO strategy for reducing greenhouse gas emissions from international shipping. INTERCARGO is working to avoid measures that may increase the owner's costs. INTERCARGO has also involved IMO discussions regarding the establishment of an MRV (Monitoring, Reporting and Verify) for emissions reduction from ships. INTERCARGO is fully concern regarding the confidentiality of the data to be informed/ monitored and the accuracy of the methodology to be used for monitoring the fuel consumption/emissions.

How have you influenced, or are you attempting to influence their position?

Vale is participating of the INTERCARGO meetings to discuss the matter and follow up on the impacts on its maritime transport.

Trade association

Non-Ferrous Alliance (NFA)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Alliance is actively involved in lobbying the UK government and relevant bodies mainly on the development of legislation and policy. The main areas of focus are climate change, carbon taxation, carbon leakage and the impacts of policy and legislation on the sustainability of existing, established businesses. The position is focused on the carbon leakage potential for globally traded commodity materials.

How have you influenced, or are you attempting to influence their position?

Vale chairs on the board of NFA and provides £6k (USD 9.2k) per annum funding. Through the Alliance, the company participates in the Manufacturers Climate Change Group (MCCG), made of senior board members of trade groups. Through these, Vale actively engages in climate change-related topics, including legislation. NFA also makes direct representation to the UK government.

Trade association

Confederation of British Industry (CBI)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Confederation is actively involved in lobbying the UK government and relevant bodies mainly on the development of legislation and policy. The main areas of focus are climate change, carbon taxation, carbon leakage and the impacts of policy and legislation on the sustainability of existing, established businesses.

How have you influenced, or are you attempting to influence their position?

Vale takes part on CBI's Energy Intensive Users Group, in which relevant topics related to climate change, including legislation, are discussed. The CBI is used as a 'sounding board' for UK Government Policy development. We also provide funding to CBI Wales but no longer have a position on the board.

Trade association

Eurometaux's Energy and Climate Change Committee

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Eurometaux is actively involved in lobbying the UK and Europe government and relevant bodies mainly on the development of legislation and policy. The main areas of focus are climate change, carbon taxation, carbon leakage and the impacts of policy and legislation on the sustainability of existing, established businesses.

How have you influenced, or are you attempting to influence their position?

Vale is an executive member of Eurometaux and sits on the body's Energy and Climate Change Committee, where relevant climate change related topics are discussed. The Eurometaux position has been directly advocated into the Cabinet of the European President, with particular concerns of carbon pricing via allowance manipulation ("backloading") and ETS revision. We are on the Executive Committee and also the Management Committee (delegated working committee that sets the direction of the group). We also provide funding.

Trade association

The Brazilian Business Council for Sustainable Development (CEBDS)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Brazilian Business Council for Sustainable Development (CEBDS) is a non-profit civil association that promotes sustainable development through articulation with governments and civil society, as well as disseminating the most current concepts and practices on the subject. The institution has represented its members in all United Nations Climate Change Conferences since 1998 and Biological Diversity since 2000. Recognition of the work has led the institution to operate in a number of international venues such as Carbon Pricing Leadership. Coalition (CPLC); the World Water Council; the Natural Capital Coalition; Low Carbon Business Action in Brazil of the European Union; the Partnership for Market Readiness (PMR) Brazil; and We Mean Business.

How have you influenced, or are you attempting to influence their position?

At the Brazilian Business Council for Sustainable Development (CEBDS), Vale participated in discussions that seek to enable the entry of the Natural Capital hub in Brazil and We are available to support, in whatever necessary, the implementation of a carbon pricing mechanism that is appropriate for Brazil.

Trade association

WBCSD - World Business Council for Sustainable Development

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. WBCSD helps make member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

WBCSD is a unique network where members learn from other leading companies; interact with the strongest partners and gain access to a one-stop shop for tools and expertise to push their sustainability journey forward.

How have you influenced, or are you attempting to influence their position?

Companies involved in climate work offer proof that business is moving beyond talk to implement real solutions by bringing different sectors and stakeholders together to scale up solutions globally. Vale believes combating climate change and transforming the energy system are core challenges on the path to a sustainable future for business, society and the environment.

C12.3d

(C12.3d) Do you publicly disclose a list of all research organizations that you fund?

No

C12.3f

(C12.3f) What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

Climate change represents a scientifically proven reality and a challenge that affects not only our productive activities, but the entire planet. Combating the impacts of climate change is a strategic priority on Vale's agenda and Vale is commitment to contribute to a low-carbon economy. We have been acting continuously, guided by scientific and practical references aligned with our internal policies and standards, to address this issue.

Publicly the company is represented by the areas of external and governmental relations. Vale has a Code of Ethics and Conduct that employees must comply with, and all issues related to climate change are previously aligned with the Sustainability Department and the Climate Change area so that the company's representatives are placed in order to follow the

company's strategies. One of these strategies is the "New Pact with Society", which seeks to positively impact society, going beyond taxes, social projects and reparation of Brumadinho, by becoming a development enabler in the areas where we operate and fostering a safer and more sustainable company, represented in practice by the Climate Change policy.

During 2019, the Executive Director was also responsible for conducting a strategic process of benchmarking and engagement that culminated with the announcement of new and more ambitious climate ambitions at the 2019 Vale Day.

Also in 2019, the Executive Committee established the Low Carbon Forum with the aim to manage the implementation of the Vale Carbon Neutral strategy. The Forum is coordinated by the Executive Director of Sustainability and includes the CEO, the CFO, the COO, the Base Metals Executive Directors, and the Business Support Executive Director in its monthly meetings.

Vale's strategy on climate change is based on the "Climate Change Policy," which has the strategic guidelines: promote absolute emission reduction (scope 1 and 2) aligned with the Paris Agreement, as well as actively contribute to reduce value-chain emissions (scope 3), act as a global catalyst for the protection and preservation of tropical forests, expand the self-generation of power via renewable sources for use by the company's operations, promote the implementation of practices and routines for energy management and efficiency and align the business portfolio with the expectations that a transition to a low carbon economy present. The policy defines principles and commitments on fighting climate change for the Company and its subsidiaries, regarding map opportunities and risks related to climate change, engagement and establish partnerships in search of transformative solutions for a carbon-neutral economy, especially in the production of steel and base metals, among others.

Vale tracks trends and studies related to climate change in global forums, which aim to define regulatory and economic strategies for mitigation and adaptation at a global level.

In Brazil, we have been participating in several discussions about the theme, collaborating with the development of policies and strategies aimed at the transition to a resilient and low carbon economy, such as participation in the Brazilian Business Council for Sustainable Development (CEBDS) and the development of "Adaptaclima" - a governmental platform for knowledge in adaptation, which seeks to contribute for access to information and the connection of stakeholders in this topic in Brazil.

We also participate in international discussion meetings, including technical reviews on economic instruments to encourage the global reduction of GHG emissions, and relevant initiatives on climate change such as: Carbon Pricing Leadership Coalition, International Council of Mining and Metals, Task Force on Climate-Related Financial Disclosure (TCFD), CDP Worldwide, and WBCSD (World Business Council for Sustainable Development).

Following the voluntary adherence to the recommendations of the Financial Stability Board Task Force on Climate Financial Disclosures (TCFD), in 2017. Upon signature, the Company also began an in-house project to tailor climate risk qualification and quantification to the TCFD recommendations, considering the scenarios proposed by the International Energy Agency (IEA).

In 2019, we defined a governance structure to manage carbon neutral strategy through the Low Carbon Forum -- a group led by the CEO and composed of six other Executive Directors and employees from different areas -- and implementation of the Sounding Panel (sustainability advisory forum for the company's top leadership) with the objective to guide and track the implementation of commitments made.

Vale is committed to integrating sustainability into its business and we have been increasing our engagement with socially responsible investors and key ESG stakeholders through webinars, roadshows and the development of a dedicated website, the “ESG Portal”.

C12.4

(C12.4) Have you published information about your organization’s response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Publication

In mainstream reports

Status

Complete

Attach the document

 Vale 20-F 2019_i.pdf

Page/Section reference

New pact with Society - new targets and goals (page 14); Our Environmental, Social and Governance (ESG) Framework (page 21 and 22); Risks Factors (page 40 and 41); Environmental Regulations (pages 89 to 90).

Content elements

Strategy
Risks & opportunities
Emission targets

Comment

Publication

In mainstream reports, incorporating the TCFD recommendations

Status

Complete

Attach the document

 Relatorio_sustentabilidade_vale_2019_alta_en.pdf

Page/Section reference

Governance and Board Comitee (pages 45 to 47); Global Sustainability Goals - Agenda 2030 (page 52); GHG KPIs - 2019 results (page 54); Risk Management - climate change as a dimension (page 58); Climate change and GHG emissions (pages 96 to 98; and, 103 to 104); TCFD (pages 99 to 102); Energy (pages 104 to 106).

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets

Comment

Publication

In voluntary communications

Status

Complete

Attach the document

Page/Section reference

Governance - Board of Directors and Leadership
Environment- Climate Change

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets

Comment

<http://www.vale.com/esg/en/Pages/ClimateChange.aspx>

C15. Signoff

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

C15.1

(C15.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	Executive Director of Sustainability and Institutional Relations	Chief Sustainability Officer (CSO)

SC. Supply chain module

SC0.0

(SC0.0) If you would like to do so, please provide a separate introduction to this module.

SC0.1

(SC0.1) What is your company's annual revenue for the stated reporting period?

	Annual Revenue
Row 1	

SC0.2

(SC0.2) Do you have an ISIN for your company that you would be willing to share with CDP?

SC1.1

(SC1.1) Allocate your emissions to your customers listed below according to the goods or services you have sold them in this reporting period.

SC1.2

(SC1.2) Where published information has been used in completing SC1.1, please provide a reference(s).

SC1.3

(SC1.3) What are the challenges in allocating emissions to different customers, and what would help you to overcome these challenges?

Allocation challenges	Please explain what would help you overcome these challenges
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SC1.4

(SC1.4) Do you plan to develop your capabilities to allocate emissions to your customers in the future?

SC2.1

(SC2.1) Please propose any mutually beneficial climate-related projects you could collaborate on with specific CDP Supply Chain members.

SC2.2

(SC2.2) Have requests or initiatives by CDP Supply Chain members prompted your organization to take organizational-level emissions reduction initiatives?

SC3.1

(SC3.1) Do you want to enroll in the 2020-2021 CDP Action Exchange initiative?

SC3.2

(SC3.2) Is your company a participating supplier in CDP's 2019-2020 Action Exchange initiative?

SC4.1

(SC4.1) Are you providing product level data for your organization's goods or services?

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	I am submitting to	Public or Non-Public Submission	Are you ready to submit the additional Supply Chain Questions?
I am submitting my response	Investors Customers	Public	No, Submit Supply Chain Questions Later

Please confirm below

I have read and accept the applicable Terms