Vale SA - Climate Change 2021

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. Vale is 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 186,237 thousand employees (74.3 thousand own and 111.9 thousand third parties). Vale also produce manganese ore, ferroalloys, metallurgical and thermal coal, copper, platinum group metals (PGMs), gold, silver and cobalt. Vale is presently engaged in greenfield mineral exploration in five countries. In addition, it operate large logistics systems in Brazil and other regions of the world, including railroads, maritime terminals and ports, which are integrated with its mining operations. Vale has a distribution center to support the delivery of iron ore worldwide, directly and through affiliates and joint ventures. Vale also have investments in energy and steel businesses and it 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 Vale's 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 Committee and to measure the results achieved. Vale's purpose 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 its employees and surrounding communities) and establishing a positive social, economic and environmental legacy in the places where it 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 net-zero 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 net-zero in its operations (scopes 1 and 2) by 2050, considering the target to reduce 33% of scopes 1&2e target to consume 100% of electricity from renewable sources by 2030 globally. In addition to the targets announced in 2019, in 2020 Vale assumed the goal of reducing Scope 3 net emissions by 15% by 2035, compared to the base year of 2018. The reduction volume was defined based on the Science Based Target Initiative-SBTI calculation tool, Absolute Contraction Approach method, so it is also considered a science-based target. Therefore, to support these goals, an internal carbon price of USD50/tCO2e is already in effect to guide Vale's capital allocation decisions aligned with the Paris Agreement goals. This price is also aligned with the 2ºC scenario, following the recommendations of the Carbon Pricing Leadership Coalition (CPLC). In this process, the Executive Vice President for Sustainability 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 Task Force for Climate Related Financial Disclosures (TCFD), an initiative that aims at promoting transparency regarding climate-related risks and opportunities. Some other relevant forums focused on climate change that Vale is part of are: International Council on Mining and Metals (ICMM), CDP, and the World Business Council for Sustainable Development (WBCSD). In 2020, Vale joined the CDP Supply Chain to report all actions and indicators focused on CO2e emissions in the value chain.; Finally Vale support efforts to mitigate GHG emissions, in collaboration with peers, by promoting innovation, developing and deploying low emissions technology, and implementing projects that improve energy efficiency. The answers given in the CDP questionnaire refer to 100% of Vale'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 access http://www.vale.com/esg/pt/Paginas/Home.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	Select the number of past reporting years you will be providing emissions data for
Reporting year	January 1 2020	December 31 2020	No	<Not Applicable>

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 Executive Officer (CEO)	The CEO is appointed by the Board of Directors. The Chief Executive Officer has the attribution to submit to the Board of Directors the names of candidates for the Executive Committee with renowned knowledge and specialization in the subject of responsibility of the respective operational area, and may also at any time submit to the Board of Directors a motion to remove. The Executive Committee meets on an ordinary basis once every fifteen days and extraordinarily whenever called by the Chief Executive Officer or his substitute. The CEO together with the Executive Committee has several duties among them: preparing and submitting to the Board of Directors, the Company's purpose, strategic guidelines and the strategic plan, in the case of the latter two, on an annual basis, considering socioenvironmental issues and executing the approved strategic plan; preparing and submitting the Company's annual and multi-annual budgets to the Board of Directors, and executing the approved budgets; planning and steering the Company's operations and reporting the Company's economic and financial performance, as well as Vale's performance in its sustainability initiatives, to the Board of Directors, and producing reports with specific performance indicators . In addition, the CEO exercise executive direction of the Company, with powers to coordinate and supervise the activities of the other Executive Officers, exerting his best efforts to ensure faithful compliance with the decisions and guidelines laid down by the Board of Directors and the General Meeting that includes: oversees the 33% reduction target for greenhouse gas emissions from Vale's operations (Scopes 1 and 2) by 2030, the 15% reduction target by 2035 for scope 3 and finally, Vale's climate change net-zero strategy.
Chief Sustainability Officer (CSO)	The Executive Vice President of Sustainability (EVPS), a position equivalent to the CSO 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. The EVPS 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, one of Vale's strategic pillars. The aforementioned EVPS coordinated the execution and approval of the Vale net-zero strategy, the plan which defines climate change ambitions for Vale for the next year, including guidelines and targets. The EVPS is also responsible for conducting a strategic process of benchmarking and engagement that culminated with the announcement of new and more ambitious climate-related intentions. 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, and to propel towards decarbonization, an internal carbon price of USD 50/tCO2e is already in effect to guide its capital allocation decisions aligned with the Paris Agreement goals. This price is also aligned with the 2ºC scenario, following the recommendations of the Carbon Pricing Leadership Coalition. The Chief Executive Officer established and coordinate the Low Carbon Forum with the aim to manage the implementation of the Vale net-zero strategy. The Forum is coordinated by the CEO and the VP of Sustainability and has the participation of Vale's Executive Vice Presidents; members of the Executive Committee. The meetings involve top leadership and technical groups from the business and corporate areas with monthly meetings to delivery of the commitments assumed through the Vale Carbon Net-Zero strategy. In 2020, the EVPS coordinated the approval by the Board of Directors the goal of reducing Scope 3 net emissions by 15% until 2035, compared to the base year of 2018. The reduction volume was defined based on the Science Based Target Initiative (SBTI) calculation tool, Absolute Contraction Approach method, so it is also considered a science-based target.
Board-level committee	Technical Committees advise the Board of Directors in monitoring Vale's activities and oversee the performance and effectiveness of the enterprise risk management conducted by the Board of Executive Officers. On these Committees there are independent members not belonging to the Board, who have experience in the Committees' related areas. Sustainability Committee is one of these technical committees and evaluates Vale's sustainability and innovation strategies, making sure they are considered in the definition of the company's global strategy. This committee is responsible for monitoring the Sustainability Plan; defining, monitoring and analyzing indicators; performance ratings, socio-environmental investments; strategies for climate change and carbon pricing; recovering and protecting degraded areas; proposing improvement actions and evaluating the implementation of mine closure and future use precepts according to best practices. It is also responsible for approving Vale's Integrated Report. The Committee works continuously, not only upon demand of the Board, and follows an annual calendar. At least 2 members of the Committee must be also members of the Board. Among some of the attributions that belong to the Sustainability Committee, is possible to 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.

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	Scope of board-level oversight	Please explain
Scheduled – all meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action Reviewing and guiding risk management policies Reviewing and guiding annual budgets Reviewing and guiding business plans Setting performance objectives Monitoring implementation and performance of objectives Overseeing major capital expenditures, acquisitions and divestitures Monitoring and overseeing progress against goals and targets for addressing climate-related issues Other, please specify (Approve adherence to climate initiatives)	<Not Applicable>	The Board' Sustainability Committee internal rules, which describes its composition, responsibilities and meetings rules are described in the document available at: . 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. 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.
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action Reviewing and guiding annual budgets Setting performance objectives Monitoring and overseeing progress against goals and targets for addressing climate-related issues	<Not Applicable>	Climate change budget is annually discussed with and approved by Executive Vice President of Sustainability after the corporate process of budged and strategic planning. Climate change risks are periodically discussed with the Low Carbon Forum and with the Executive Committee of Executive Vice Presidents.. Opportunities, such as changing internal energetic matrix and energy efficiency are discussed periodically as well.

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)	Reporting line	Responsibility	Coverage of responsibility	Frequency of reporting to the board on climate-related issues
Chief Executive Officer (CEO)	<Not Applicable>	Both assessing and managing climate-related risks and opportunities	<Not Applicable>	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 Vice President of Sustainability) is the highest-level in management position responsible for climate change. This position is below the Executive Committee of Executive Vice Presidents, 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 Committee, 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 Executive Committee.

Vale's purpose is: Vale exists to improve life and transform the future. Together. Vale believes mining is essential to the world's development. Vale only serve society when it generate prosperity for all and take care of the planet. 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, in accordance with the Annual Strategic Planning and Budget Cycle, 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 Net-zero strategy. The Forum is coordinated by the Sustainability Executive Committee and has the participation of Vale's CEO and the Executive Directors of Ferrous, Base Metals, Strategy and Finance and Investor Relations. 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	In 2020, Vale adopted metrics even more focused on environmental, social and governance (ESG) issues when considering its officers' short- and long-term variable compensation, seeking to strengthen Vale's strategic pillars of Safety & Operational Excellence and the New Pact with Society. Compensation alignment with Vale's ambition to be a leader in low carbon mining, through the readjustment of the organizational structure, with impact on the short-term Annual Bonus, which in 2020 had 10% of the weight for the goals linked to this initiative, and the inclusion of ESG (Environmental, Social and Governance) goals in the share-based variable compensation (long-term programs). Out of those, 5% is related to Vale's climate agenda. For long-term compensation, with 20% of ESG-related goals, 6% of that is connected to its climate challenge.

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 inventivized	Comment
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. In 2020, the targets related to the climate agenda represented 10% of the employees' short-term variable remuneration, including CEO and Executive Committee. Out of those, 5% is related to Vale's climate agenda. For long-term compensation, with 20% of ESG-related goals, 6% of that is connected to its climate challenge.
Board/Executive board	Monetary reward	Emissions reduction target Other (please specify) (A target composed of indicators for greenhouse gas emissions, recovery and protection of forest areas, and assurance of renewable energy was also tied to the long-term compensation of the leadership.)	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 2020, the targets related to the climate agenda represented 10% of the employees' short-term variable remuneration, including CEO and Executive Committee. Out of those, 5% is related to Vale's climate agenda. For long-term compensation, with 20% of ESG-related goals, 6% of that is connected to its climate challenge.
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 2020, the targets related to the climate agenda represented 10% of the employees' short-term variable remuneration, including CEO and Executive Committee. Out of those, 5% is related to Vale's climate agenda. For long-term compensation, with 20% of ESG-related goals, 6% of that is connected to its climate challenge.

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, Vale 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.

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. 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. 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 Committee and disclosed in the Annual Report (Form 20-F) and Vale's Integrated Report. The Vale Risk Management Executive Committee is responsible for supporting the Executive Committee in decisions related to risk management. 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 and prioritized. For climate change physical risks, based on scenarios of IPCC Vale developed the Vale Climate Forecast in partnership with the Vale Institute of Technology to help operational areas prioritize risks. The analysis included different regions of operation and evaluated the prospects for increasing average temperature and changes in hydrological patterns. For transition risks, Vale implemented an internal carbon pricing (shadow price) to enable analysis of 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. 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 Vale's ability to achieve its strategy. Although Vale's definition of a noun varies with time and situation, Vale 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
1) How climate-related risk are identified and assessed: 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 resulting from the transition to a low carbon economy and physical impacts, in line with the guidelines of the Task Force on Climate-related Financial Disclosures - TCFD. For the transition risks, analyses were prepared on the resilience of the strategy, on the financial impacts, in face of different Climate Change scenarios, in addition to the periodic regulatory monitoring. 2) Process in place for assessing which risks could have a substantive financial or strategic impact: Vale assess the impact via scenario analysis, which demonstrates the material and financial impact of transition risks on the different businesses, in the EBITDA. Vale decided to use the International Energy Agency (IEA) scenarios which are recognized industry-wide and have ample international support. Vale's main risks related to climate change are: Regulatory/Legal, Technological, Market, Reputation e Physical risks. 3)Illustration of risk management method for a transition risk: As part of the strategy, and in line with the recommendations of the Task Force on Climate Related Financial Disclosures (TCFD), to what refers to the transition risks, Vale made an analysis of the resilience of its strategy paired up against three climate change scenarios, considering as a baseline the scenarios put forth by the International Energy Agency (IEA). Building climate-related scenarios enables Vale to identify indicators to monitor the external environment and quickly adapt to the needs identified from each scenario to the extent that one or another comes to reflect the emerging reality of the given topic. In order to support Vale's transition risk management process, the exercise of scenarios is updated on a recurring basis due to the evolution of trends and the appearance of new threats in the external environment. The conclusions are used as inputs for the Annual Strategic Planning Cycle, a process with the participation of the business and support areas, the Executive Committee and the Board of Directors. Case: One of the internal tools adopted to operationalize the Vale Net-Zero Strategy is the carbon price, implemented in June 2020. At the end of 2019, to anticipate this risk, Vale adopted, as a mitigation measure, an internal shadow carbon price of US$50/tCO2e is in line with what is needed to limit temperature increase to less than 2°C and is integrated into the economic-financial feasibility analysis of capital projects and current projects (sustaining), within the budget and strategic planning cycles from 2020. For project prioritization, Vale uses the Marginal Expansion Cost Curve (MACC). The association of cost to GHG emissions in the viability analysis allows us to explain the impact of emissions on project evaluation at the moment of the decision, making the Carbon Target portfolio projects viable. The expected result is that with carbon pricing the projects with the lowest impact on climate change and on Vale's revenues are mapped. The quantification of GHG emissions from projects and investments is the first step towards establishing a carbon price. Once the carbon of the projects is accounted for, the carbon is monetized, and the emission cost is included in the project's financial indicators and results. 4)Illustration of risk management method for physical risks: Based on IPCC studies, Vale developed, with Vale Technological Institute, a model for the projection and mapping of the possible physical impacts for the Vale's operations. The forecasts were made for sections of Vale's integrated logistics corridors, in particular the "northern corridor," the "southern corridor," the "southeastern corridor" and Corumbá". Currently, Vale is implementing the "Vale Climate Forecast", an internal methodology for the management of the physical risks associated with the climate changes, which is divided into: Very short-term, midterm, and seasonal forecasts for the physical risks, whose main focus is the mitigation of impacts on the operation and shipment of products. Long-term analysis, which the main focus is the assessment of the impacts of the climate change in a multi-year horizon, aiming to evaluate the necessary investments in the facilities for their adaptation/mitigation (planning). Case: In Port of Ponta da Madeira, site for the pilot for implementation of the Vale Climate Forecast, an application with rain forecasts was developed making it feasible to disseminate the data in a way which is systematic (daily) and helpful to neighboring operators, as it is also made available to all operators at the Port. This data is now available to assist in Vale's Production Schedule, helping decision-making in the operations of shipments and distribution of iron ore and other products. With these forecasts in hand, the operators optimize the product shipment plans and minimize the risk of non-shipment due to excessive humidity content in the ore. It is worth adding that the weather forecast data will also be made available in dashboards to achieve the highest possible number of users. The analysis of short-term climate risks enables the inclusion of climate variables in the decision-making processes of Vale's operations systematically. It generates a higher control against the impacts of climate change-impacts which are already being witnessed in/around Vale's operations as they are elsewhere worldwide– helping to mitigate the causes of risks and their potential negative consequences for the business.

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	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. 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: • 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 International Maritime Organization (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. Policy and regulatory risks are particularly relevant for Vale where regulations aimed at reducing emissions may have a particularly direct effect on its operations, value chain, and demand for its products. For example: Currently 22% of global emissions are priced, according to report of the World Bank "State and Trends of Carbon Pricing 2020" 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 Vale's products.
Emerging regulation	Relevant, always included	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 as Vale. 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 consequence will be the increase in the cost of Vale's products, in addition to indirect costs, such as those of the value chain (mainly energy supply and impacts on contract costs). 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. To anticipate this risk Vale has adopted in 2019 an internal carbon price (shadow price) of USD 50 per ton of CO2 equivalent applicable for economic-financial analysis of current and capital investments, used in Marginal Abatement Cost Curve (MACC) and projects prioritization. The carbon price methodology started to be applied in June 2020. The association of cost to the greenhouse gas emissions in the feasibility analysis enables explaining the impact of the emissions on the project valuation at the time of decision making the projects from the Carbon Target portfolio feasible. This price is also aligned with the 2ºC scenario, following the recommendations of the Carbon Pricing Leadership Coalition.
Technology	Relevant, always included	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 adaption of Vale in the new low-carbon economy. Main Climate-related Technology risks mapped by Vale: in climate change report, it was considered 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. The Vale is already working with this scenario due to this change in market demand. For example: net operating revenues from sales of coal decreased by 53.7%, in 2020. 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 Vale's portfolio in order to provide solutions to its customers and to adapt to potential market demands Vale has evaluated its portfolio of assets and announced in early 2021 the divestment of its coal business, a strategy in line with the company's focus on prioritizing its core businesses and its ESG agenda.
Legal	Relevant, always included	For Transitional risk (Regulatory changes, Legal, Technological, Market and Reputation), Vale created a carbon shadow pricing tool that foresees possible future impact on operational cost for each Project. It includes direct costs due to carbon pricing mechanisms and indirect costs, considering the impact on the supply chain related to carbon pricing mechanisms. Environmental legislation is becoming more stringent around the world, which can lead to higher costs for compliance with environmental laws. Vale expects 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. 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 net zero mining company. 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 2ºC. In 2020, Vale committed to a target to reduce scope 3 net emission by 15% until 2035, with 2018 as baseline.
Market	Relevant, always included	For Transitional risk (Regulatory changes, Legal, Technological, Market and Reputation), Vale created a carbon shadow pricing tool that foresees possible future impact on operational cost for each Project. Vale has developed an integrated risk management framework that considers the impact on its 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 Vale operates (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. This risk represents a great opportunity to continue to improve Vale's portfolio in order to provide solutions to its customers and to adapt to potential market demands. Vale has developed premium products that can reduce emissions in steelmaking and fulfill regional needs. Moreover, there are other risks such as: steel demand may stagnate due to building retrofit, alternative options of urban mobility, assumed efficiencies down the value chain etc; possibility of arising a nickel-free battery may supress nickel demand; and recycling for both Nickel and Copper, where the significantly level of recycling is critical for the base metals strategy. However, the main emerging technologies in a low-carbon economy are based on direct reduction via low carbon hydrogen and CCUS associated with different commercials or innovators production routes. These technologies can differently impact Vale's strategy for high quality products, pushing direct reduction pellets or downplaying the importance of high-quality materials if carbon capture massively succeeds. Furthermore, in order to reduce the use of coal, it is possible to expand the use and capacity of the electric arc furnace and/or even intensify the use of scrap in all processes.
Reputation	Relevant, always included	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. 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 Vale operates and fostering a safer and more sustainable Brazilian mining industry. 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 net zero mining company: • To reduce 33% of the absolute emission of scopes 1 and 2 in 2030, aligned with the Paris Agreement.; • To become net zero (scope 1 and 2) by 2050. In 2020, Vale committed to a target to reduce scope 3 net emission by 15% until 2035, with 2018 as baseline
Acute physical	Relevant, always included	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, Vale considered an average loss of 0.5% in the production of iron ore and coal due to abnormal precipitation conditions. 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. 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.
Chronic physical	Relevant, always included	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. 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.

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

Climate risk type mapped to traditional financial services industry risk classification
<Not Applicable>

Company-specific description
The pricing of GHG emissions may impact Vale's operational costs, mainly through higher price for fossil fuels as mining is an energy intensive industry, and its cost of international freight. The consumer has been searching for products with a lower carbon footprint, which will drive the reduction in the use of coal. Case Study: S) 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 UK 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 Vale's coal costumers. T) Climate change policies may continue to adversely impact coal demand on Vale's clients in Europe, North America and China. At the end of 2019, Vale adopted an internal carbon price (shadow price) of US$50/tCO2e. For companies, an internal carbon price enables evaluation of the financial impact of the low-carbon strategy and anticipation of potential regulatory risks related to emission restrictions. A) Vale has evaluated its portfolio of assets and announced in early 2021 the divestment of its coal business, a strategy in line with the company's focus on prioritizing its core businesses and its ESG agenda. This divestment is aligned with SDS preview scenario where the thermal coal will be severely impacted by the growth of renewables, and metallurgical coal by the decarbonization of the steel industry. Under SDS, the global demand for thermal coal decreases significantly, displaced by low-carbon technologies that become responsible for around 85% of the global electricity generation. R) As a result, the share of coal in the electricity mix is lower than 10% by 2040. Vale's sales of coal have been decreasing annually. In 2020 Vale's total net operating revenues decreased 53.7% compared to 2019. This risk represents a great opportunity to continue to improve its 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-high

Are you able to provide a potential financial impact figure?
Yes, a single figure estimate

Potential financial impact figure (currency)
548000000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact figure
Coal consumption for power generation has fallen for the sixth consecutive year in Europe, and demand is estimated to drop by more than 30% 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. Vale's net operating revenues from sales of coal decreased by 53.7% to US$473 million in 2020, from US$1.021 billion in 2019 (impact of US$548 million). The decrease is mainly attributable to lower sales volumes (impact of US$344 million) and lower realized sales prices, in each case for both thermal and metallurgical coal (impact of US$204 million), as a result of deteriorated market conditions. In 2020, the pandemic COVID-19 also contributed to decreased coal sales. For example: In India, thermal coal demand ebbed with seaborne imports decreasing by approximately 27 million metric tons in 2020 compared to 2019, due to decreased power generation during India’s COVID-19 lockdown period.

Cost of response to risk
1900000000

Description of response and explanation of cost calculation
The scenarios analysed by Vale showed that the steel industry decarbonization will put a high value in high-quality, lower-emission products. Vale's current strategy already considers a portfolio with a 90% share of these products by 2024. Case: - S: 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. To development this project, BNDES has provided us with credit line of US$1.9 billion financing for Vale's S11D project and its infrastructure (CLN S11D). This investment is distributed in infrastructure (equipment, machinery, etc.) and for operating activities. T/A: S11D 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. The CLN S11D project was launched in 2014 to increase the logistics capacity of the Northern System to support the S11D mine, including the expansion of approximately 570 km of railway, construction of a railway spur of 101 km, acquisition of wagons and locomotives and port expansion (onshore and offshore expansions at Ponta da Madeira maritime terminal). The project had a start-up in December 2016, with capacity at the railway being continuously added until December 2019. Until 2022, the project will be in a monitored ramp-up phase with additional works expected on adjustments, especially at the Ponta da Madeira port terminal. It is worth noting that this project represents a major shift in production stream, thus, requiring large initial investments in the short-term. R: The 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.

Comment
n.a.

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

Climate risk type mapped to traditional financial services industry risk classification
<Not Applicable>

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 Vale's operational costs, mainly through higher price for fossil fuels as mining is an energy intensive industry, and its cost of international freight. In particular, consumption of thermal coal, one of the products Vale 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. Vale's coal net operating revenue in Japan represent 4.2% (US$ 20 million) of its total coal net operating revenue in 2020 (US$ 473 million). The coal business in Japan had a reduction of 83.3% in relation to 2019. From US$ 120 million in 2019 to US$ 20 million in 2020. For example, in 2019, Vale was taxed by US$ 15,230 (1.6M yen) due to its emissions in Japan. This tax amount to 12.7% of coal net operating revenue 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)
480000000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact figure
Vale has adopted in 2019 an internal carbon price of USD 50 per ton of CO2 equivalent applicable for economic-financial analysis of current and capital investments, utilized in Marginal Abatement Cost Curve (MACC) and projects prioritization. The carbon price methodology started to be applied in June 2020. The association of cost to the greenhouse gas emissions in the feasibility analysis enables explaining the impact of the emissions on the project valuation at the time of decision making the projects from the Carbon Target portfolio feasible. 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 9.6 MtCO2e) were taxed. This tax would represent US$ 480,000,000 = 9.6 MtCO2e x USD50/tCO2e

Cost of response to risk
4919800000

Description of response and explanation of cost calculation
At the end of 2019, Vale adopted an internal carbon price of 50 dollars per ton of CO2 equivalent (US$50/tCO2eq). This price is aligned to the temperature targets of the Paris Agreement (well below 2°C), according to the recommendations of Carbon Pricing Leadership Coalition (CPLC). In June 2020, the use of the internal carbon price in economic-financial analysis of new investments and sustaining projects started. The carbon price started supporting the risk and opportunity assessment, selection and prioritization of projects, contributing to Vale's decarbonization trajectory. It shall be pointed out that Vale also elaborated its Marginal Abatement Cost Curve which shows the emission (Scopes 1 and 2) reduction initiatives that were mapped in the company. The MAC Curve uses as a reference the adopted internal Carbon Price of US$ 50.00. Vale forecasts an investment of US$ 4 to 5 billion to implement the mapped initiates to reduce scopes 1 and 2 emissions until 2030, in an advance compared to a previous estimate that provided for investments of at least US$ 2 billion. From this new forecast, US$ 2 billion will be allocated to the electrical matrix, electrification and breakthrough technologies and US$ 2-3 billion to energy efficiency, renewable electricity and Biofuels. The increase in investments is due to the greater maturity acquired in the company's portfolio of direct emissions reduction initiatives (Scope 1) and these initiatives can mitigate the risks of carbon taxes estimated previously. In 2020, Vale spent already US$80.2 million and the current portfolio of initiatives consolidates more than 35 projects. Case Study: S: Vale has created an internal program called PowerShift to support its sustainability goals, focusing on the transition to a low-carbon economy. T/A: 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. R: PowerShift-linked initiatives are expected to contribute approximately 40% of Vale's planned reductions of Scopes 1 and 2, by 2030.

Comment
n.a.

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

Climate risk type mapped to traditional financial services industry risk classification
<Not Applicable>

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 interruptions 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 interruptions due to flooding and ore loading in Porto that need to comply with quality criteria and standards to avoid problems in shipping. The EFC railroad, that Vale's have a concession agreement up 2057, is responsible to links its Northern System mines in the Carajás to the Ponta da Madeira maritime terminal. In 2020 the EFC railroad transported 192,381 thousand metric tons of iron ore and 13,887 thousand metric tons of other cargo. EFC also carried 145 thousand passengers in 2020. EFC supports the largest train, in terms of capacity, in Latin America, which measures 3.5 kilometers, weighs 41.67 thousand gross metric tons when loaded and has 330 cars. In 2020, EFC had a fleet of 229 locomotives and 22,185 wagons, which were operated by Vale and third parties.

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)
138765000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

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, Vale considered an average loss of 0.5% in the production of iron ore and coal due to abnormal precipitation conditions. Considering 2020's iron ore net operating revenues of US$27.28 billion, it would have accrued a loss of about US$ 136.4 million per year. Considering the net operating revenues from sales of coal US$473 million the coal shipments would have accrued a loss of about US$ 2.37 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$138.8 million in 2020. This value represents 0.5% of the net operating revenues from iron ore and coal combined (US$ 136.4 million + US$ 2.37 million = US$ 138.8 million).

Cost of response to risk
1610000

Description of response and explanation of cost calculation
Based on the Intergovernmental Panel on Climate Change (IPCC) scenario studies, Vale, in partnership with the Vale Technology Institute, has developed the Vale Climate Forecast, a methodology for analysing risks and opportunities related to climate change. The "Vale Climate Forecast" enabled Vale to update the diagnosis of risks and impacts caused by the Climate Change in the North, South and Southeast Corridors. To be implemented in Port of Ponta da Madeira, site for the pilot, the Vale Climate Forecast had an investment approximately US$ 10 thousand (BRL 50,000). Vale also 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. To assist the physical impact map identify operational risks related to climate change, Vale bought a radar that was installed in Carajás urban area. The radar had an investment approximately US$ 1.6 million (BRL 8 million). Vale has an operational risk area which conducts periodic risk analysis for all Vale businesses and operations, including those related to climate change. The costs of response to risk of changes in precipitation patterns and extreme variability in weather patterns are the investments sum in Vale Climate Forecast (US$ 10 thousand) and Physical Impact Map (US$ 1.6 million).

Comment
n.a.

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 to consume only electricity from renewable sources in Brazil by 2025 and globally by 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. Around 90% of our power consumption is renewable mostly based on our hydro powerplants and we are on track to reach 100% in Brazil up to 2025, and globally, by 2030. Vale has a world-class low-carbon innovation program known as PowerShift. Its goal is to transform our energy matrix away from fossil fuels through increased energy efficiency, renewable energy, zero-emissions technologies, and new processes. Since its launch, in 2018, we have implemented pilots, for all operations paving the way to reach our 2030 targets, if successful and implemented at scale. Since 2018, the share of renewables sources in Vale's energy matrix evolved from 26% to 31%.

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)
103500000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact figure
What approach was employed to calculate the 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. The figures used in your calculations: Vale estimates these actions can reduce up to 2.070.000 tCO2/year. Vale has adopted in 2019 an internal carbon price (shadow price) of USD 50 per ton of CO2 equivalent applicable for economic-financial analysis of current and capital investments, utilized in Marginal Abatement Cost Curve (MACC) and projects prioritization. Multiplying these values, the annual financial impact would be USD 103,500,000.

Cost to realize opportunity
500000000

Strategy to realize opportunity and explanation of cost calculation
Situation: Energy management and efficient supply in Brazil are priorities for us, given the uncertainties associated with changes in the regulatory environment and the risk of rising electricity prices. In 2020, Vale's installed capacity in Brazil was 1.8 GW, sourced from both directly and indirectly owned power plants. Task: Vale have developed its energy assets based on the current and projected energy needs of its operations, with the goal of reducing its energy costs, minimizing the risk of energy shortages, while also meeting its consumption needs through renewable sources. Action: In December 2020, Vale announced the Sol do Cerrado project for the generation of solar energy, in the municipality of Jaíba, in the state of Minas Gerais, Brazil. The project contemplates the construction of a photovoltaic plant, including 17 sub-parks that total an installed capacity of 766 megawatts peak (MWp). It also includes the implementation of an elevator substation, transmission line and connection bay at the 230kV Jaíba substation, with contracts signed for connection to the Brazilian National Interconnected System. The implementation of the project will require investments of approximately US$500 million, this amount corresponds to the CAPEX of the Sol de Cerrado Project, which includes equipment installation, infrastructure, power generation, etc. The project will produce approximately 193 average megawatt (MWa) of energy per year for Vale's operations, corresponding to 13% of its estimated demand in 2025, and its operational start-up is expected for the fourth quarter of 2022. Result: Sol do Cerrado project will bring an annual cost reduction of US$ 70 million to Vale beside than reduction in the emission.

Comment
n.a.

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
Vale Natural Reserve (RNV, Reserva Natural Vale) is one of the main protected areas maintained by Vale. Located in BR 101 Highway, KM 122 Linhares, Espírito Santo, Brazil, preserves an almost-untouched, unique area of Atlantic Forest in Linhares (Espírito Santo). It is about 23 thousand hectares – equivalent to the size of 23 thousand soccer fields. In 1978, RNV became an area officially designed for conservation and scientific research. Vale Natural Reserve's entomological collection started in 1986. Today, the collection has almost 12,600 insect specimens from several groups. Most of them are dry preserved using entomological pins, but there are also insects on

mats. Vale Natural Reserve's herbarium started in 1963 and its collection has 16,150 exsiccata from several plant groups. The scientific collections of Vale Natural Reserve have a wide diversity of species, including rare and endangered species. Among the samples of plants preserved in the Herbarium, the tree called Jueirana-facão (Dinizia jueirana-facao) stands out, a rare and threatened species, found exclusively in the Atlantic Forest of Tabuleiro in Espírito Santo. The tree can reach 40 meters in height and weigh about 62 tons. Vale Natural Reserve has a collection of beehives of different species: Mosquitinho (Plebeia sp.); Jataí (Tetragonisca angustula) and; Uruçu-amarela (Melipona mondury). It works as an important environmental tool, because bees have a direct participation in the reproduction of most Brazilian botanical species and are an important bioindicator for the analysis of the quality of the environment.

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)
1100000000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact figure
What approach was employed to calculate the 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. The figures used in your calculations: 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
2079300

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 in 2020 US$ 2,079,300 in the reserve, one of the last great remnants of the threatened Tabuleiro and Posto Avançado Forest at the Atlantic Forest Biosphere Reserve. This investment was used to some spent in Reserve: Staff relative-expenditure US$ 851,709 (41%); AIP expenditure US$ 462,587 (22%); Operational expenditure US$ 148,108 (7%) and; Maintenance expenditure with Vale Natural Reserve (RNV in Portuguese) US$ 126,328 (6%). In additional, RNV invested in equipment US$ 60,994 (3%), socioenvironmental initiatives US$ 297,001 (14%) and donation to Vale Environmental Institute US$ 132,571 (6%). 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
Copper may be positively impacted by increased demand for electrical vehicles and power generation for energy transition, once this metal is used in equipment such as batteries and components for the power generation facilities. According to IEA study, growth in the demand for copper, represents, for example, more than 50% in the demand for minerals for offshore wind power generation and for 25% for minerals for electrical cars, considering the SDS and STEPS scenarios. This is relevant for Vale since in Brazil, we produce copper concentrates at Sossego and Salobo, in Carajas, in the state of Para. In Canada, we produce copper concentrates, copper matte and copper ´ cathodes in conjunction with our nickel mining operations at Sudbury and Voisey's Bay. We have significant opportunities to grow our copper business organically. We have a strong portfolio of copper assets and plan to develop a multi-year copper expansion plan, with Salobo III, Alemao and Cristalino being competitive projects that will support our strategic goal of production capacity of around 500 thousand tons per year. In addition to these projects, we have other opportunities to grow in the future, benefiting from the knowledge and logistics that already exist in the Carajas region, while we also evaluate opportunities to increase copper production in Canada. We are also engaged in greenfield exploration for copper in some of the world's most prolific belts, looking for tier-one assets for future development. The copper business still has the potential to expand, through partnerships, the Hu'u project, a world-class deposit located in Indonesia.

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)
293200000

Potential financial impact figure – minimum (currency)
<Not Applicable>

Potential financial impact figure – maximum (currency)
<Not Applicable>

Explanation of financial impact figure
What approach was employed to calculate the figure: This impact is difficult to estimate, since changes in demand depend on several factors and on complex social and economic relations. However, Vale can estimate the impact magnitude considering, for example, a 50kt increase in copper production per year, for the first 5 years, in Salobo in the Carajás region, in Brazil, that could help meet the demand increase for copper estimated for the energy and transportation sectors. At an average price of USD 5,864/t, the potential financial impact figure is calculated by multiplying the increase in the production by the average copper price. The figures used in your calculations: Cooper: (50kt) x ($5,864/t)=$293,200,000

Cost to realize opportunity
470000000

Strategy to realize opportunity and explanation of cost calculation
Vale is monitoring this opportunity through public studies and announcements of the electric vehicles industry and energy transition. However, copper prices and demand should first shift, in order to drive more precise actions. In the long term, the battery and energy transition segments show important upside potential as electric vehicle production and low-carbon power generation continues to attract significant investments, which could positively affect copper price and demand. The cost to manage this opportunity would be related to the increase in copper production in Salobo III. Case: The Salobo III copper project, approved in October 2018 by our Board of Directors, is a brownfield expansion of our Salobo operations, increasing processing throughput capacity. The project encompasses a third concentrator line and will use Salobo's existing infrastructure. Salobo III is expected to produce an average copper volume of approximately 50 ktpa in the first 5 years, 42 ktpa in the first 10 years and 36 ktpa throughout the life of mine. Start-up is scheduled for the first half of 2022 with a ramp up of 15 months. In 2020, 68% of the project's physical progress was completed, with the partial conclusion of earthworks and ground preparation, and conclusion of construction of gearless engines and part of the heavy structures by international providers. For the Salobo III project the total CAPEX executed so far is US$346 million, being US$ 210 million spent in 2020 and is expected to cost the total of US$ 816 million, so US$ 470 million will still be invested. All this investment was estimated for 3.5 years, in infrastructure and productive activities. Moreover, under several climate change scenarios, Vale's EBITDA performs in a range of 90% to 140% in relation to base case (Volumes from Strategic Plan in 2040, considering prices from Wood Mackenzie in September 2020). Such resilience is the result of a flexible portfolio; capable of adapting to different market conditions and well aligned with energy transition trends.

Comment
n.a.

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) Is your organization's low-carbon transition plan a scheduled resolution item at Annual General Meetings (AGMs)?

	Is your low-carbon transition plan a scheduled resolution item at AGMs?	Comment
Row 1	Yes	Vale's low-carbon transition plan is a scheduled resolution item at AGMs. In its website (http://www.vale.com/esg/en/Pages/BoardDirectorsAndLeadership.aspx) the shareholders and stakeholders may access the main issues deliberated in Annual General Meeting of Shareholders, included issues about low-carbon transition.

C3.2

(C3.2) Does your organization use climate-related scenario analysis to inform its strategy?
Yes, qualitative and quantitative

C3.2a

(C3.2a) Provide details of your organization's use of climate-related scenario analysis.

Climate-related scenarios and models applied	Details
IEA Sustainable development scenario IEA CPS Other, please specify (STEPS)	1)Scenarios, inputs, assumptions, and analytical methods: 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. As the TCFD suggests, in 2020 Vale opted to use the IEA scenarios, which are recognized by the industry and have international backing. The different supply and demand behaviors in the three IEA scenarios result in changing competitiveness dynamics that affect the long-term price of Vale's main commodities and its strategy. For the company, the CPS impacts, in part, its ability to generate value. Besides the higher exposure to physical risks, the CPS does not consider the opportunity for growth of renewables, electrification of transportation and the need to decarbonize steelmaking, all of which are key parts of Vale's strategy today. The Sustainable Development Scenario-SDS, on the other hand, creates an ecosystem that encourages the company's growth options and amplifies the relevance of its strategic pillars, which are base metals transformation and maximization of iron ore flight-to-quality. 2)Time horizon: Each scenario was evaluated in a 12 years horizon (up to 2030). 3) Results' impact: The coal asset is negatively impacted in the Stated Policies Scenario-STEPS and SDS scenarios but is not representative in the consolidated result. On the path to net zero, Vale has evaluated its portfolio of assets and announced in early 2021 the divestment of its coal business, a strategy that is in line with the company's focus on prioritizing its core businesses and its ESG agenda. Under a variety of climate change scenarios, Vale's EBITDA performs in a range of 90% to 140% relative to the base case used in its strategic planning. This resilience is a result of a flexible portfolio that is able to adapt to different market conditions and a low-carbon economy. 4) Results: Coal consumption for power generation has fallen for the sixth consecutive year in Europe, and demand is estimated to drop by more than 30% 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. Vale's net operating revenues from sales of coal decreased by 53.7% to US$473 million in 2020, from US$1.021 billion in 2019 (impact of US$548 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. Case Study: S) Vale revenue from coal sales could be affected by lower emission policies, such as Carbon Taxes and Emission Trading Schemes. T) Climate change policies may continue to adversely impact coal demand on Vale's clients in Europe, North America and China. At the end of 2019, Vale adopted an internal carbon price (shadow price) of US$50/tCO2e. For companies, an internal carbon price enables evaluation of the financial impact of the low-carbon strategy and anticipation of potential regulatory risks related to emission restrictions. A) Vale has evaluated its portfolio of assets and announced in early 2021 the divestment of its coal business, a strategy in line with the company's focus on prioritizing its core businesses and its ESG agenda. This divestment is aligned with SDS preview scenario where the thermal coal will be severely impacted by the growth of renewables, and metallurgical coal by the decarbonization of the steel industry. R) As a result, the share of coal in the electricity mix is lower than 10% by 2040. Vale's sales of coal have been decreasing annually. In 2020 Vale's total net operating revenues decreased 53.7% compared to 2019. This risk represents a great opportunity to continue to improve its portfolio in order to provide solutions to our customers and to adapt to potential market demands.
RCP 2.6 RCP 4.5 RCP 8.5	1)Scenarios, inputs, assumptions, and analytical methods: In 2020 Vale updated its qualitative analysis of the vulnerabilities and probability of impacts related to climate change in some operations, a work aimed at the long-term, and carried out in parallel to the work by the ITV on climate projections and by the operational areas for the adaptation and better management of water resources. For this purpose, a tool proposed by the Standard Chartered Bank was utilized, which indicates on a map the points most likely to be impacted by climate changes, such as flooding and sea level rise. The analysis uses projections based on IPCC, RCP 2.6, RCP 4.5 and RCP 8.5 Scenarios. 2) Time horizon(s) and relevance: Vale consider the time horizon for the 2050 and 2100 (long-term), because the main risk is sea level rise. 3) Results: For example at the Guaíba Island Terminal (TIG), in Rio de Janeiro, the results point to the risks of impacts caused by the higher levels of precipitation in the region and the likely increase in the sea level. The management of physical risks related to climate change is connected to the emission reduction strategy to contain global warming. The results from this process contribute to avoiding/minimizing the occurrence of the risk factors at play and form an integral role in the structuring of robust adaptation/mitigation plans to address instances in which the risk factors materialize. 4) Case study: The mining industry chain is formed by logistical processes, beginning with mineral extraction and transportation using the railway system and ultimately reaching the port through which the production flows. Most of these processes occur in the outdoors and are often impacted, directly or indirectly, by extreme weather events such as intense droughts and prolonged rainy periods, which interfere with operational routines, cause losses in production, and cause accidents with equipment and people. In studies in Canada regarding mineral vulnerability to climate variations, found that mine areas showed significant climate risks.To investigate future climate patterns, Vale used a regional climate modelling analysis of the regional characteristics. The evaluation of the regional model PRECIS in reproducing the climate extremes along the mining chain region in the eastern Amazon region, hereinafter called the mineral chain, is based on the comparison with the observational network of the CPC from 1981 to 2005. The probabilities of occurrences of these extremes in the future (up to 2050) are obtained from the simulations with PRECIS, considering the IPCC RCP 4.5 intermediate emission scenario. The results of this study suggest an increasing risk to the processes of the mineral chain until 2050 associated with the occurrence of climate extremes, since it is susceptible to adverse weather and climate conditions. However, the analyzes provided by this study can help decision makers and stakeholders to carry out long-term planning considering the impacts of climate extremes in the future on the processes in the mineral chain.

C3.3

(C3.3) 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	1)Description: 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. 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 1.2% of its operating revenues in 2020. 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. 2)Time horizon: Thus, Vale is making possible the Substitution of existing products and services with lower emissions options in a short-term. Vale conducts a business resilience test in the various climate change scenarios for a long-term horizon (10 years or more), with the aim of being prepared for the challenges of the transition to a low carbon world. 3)Case: S: Costumer and investors are searching company with aim transition to a low carbon economy. Vale is looking beyond for a greener portfolio in the long term and a great example of that is the Tecnored technology. T: Vale informs that it has reached a non-binding heads of agreement to establish a new venture (NewVen) to supply low GHG (greenhouse gases) metallics and steel making solutions to the steel industry with Kobe Steel, Ltd and Mitsui & Co., Ltd. A: Tecnored is a 100% Vale subsidiary focused on developing a low carbon pig iron process through the use of energy sources, such as biomass, syn-gas and hydrogen, that emit less CO2 than the coal and coke the tradition iron-making processes use. R: Using biomass, the path to economic net zero may be achieved in the medium term.
Supply chain and/or value chain	Yes	Vale is already observing impacts on some supply chain strategies based on climate-related risks, for example ,the risk related to IMO's target of reducing by 50% the absolute GHG emissions of international shipping by 2050 based on 2008 levels. Vale's adhesion to the MOU on joint study of common issues on ammonia as an alternative marine fuel is part of its strategy to reduce its carbon emissions in its value chain, by adopting cleaner technologies. On the short term focusing on the uptake of energy efficiency related technologies, Vale partnered in 2020 with VLOC owner Pan Ocean and in 2021 has delivered two pioneering projects: The largest Rotor Sails installation onboard the 325,000 DWT VLOC MV Sea Zhoushan and the largest Air Lubrication System onboard the 325,000 DWT VLOC MV Sea Victoria. Both vessels are already considered between the most efficient class of vessels in the world and the energy efficiency technologies installation are expected to show it is possible to further reduce the emissions. 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. Vale also engages several R&D partnerships aimed at evaluating options for vessel efficiency gains and reducing GHG emissions. 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 has encouraged your value chain in emissions management, through a contractual clause and the application of an annual questionnaire on GHG. Vale suppliers considered key in terms of emissions in the supply chain are annually invited to participate in the CDP Supply Chain program. As result in the first year we had a representative result where 55% of the invited companies (274) submitted their answer. These companies combined represent 63% of spend purchased with in categories classified as critical in 2019 and in CDP's analysis this is an excellent number. In addition, it represents a 30% increase over the companies that submitted the Vale questionnaire in 2019.
Investment in R&D	Yes	Through the adoption of existing technologies into new forms or developing new technologies and processes in R&D initiatives, Vale seeks to transform its businesses. At Vale, the use of technology seeks to redesign the way Vale works, helping to eliminate certain risk scenarios, positioning us as a leader in safety and risk management and promoting sustainability and adaptation to climate change. 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. Investment in R&D represents a crucial risk mitigation strategy for a long-term horizon (10 years or more) and a substantial opportunity, generating the development of new technologies capable of increasing productivity and decreasing GHG emissions.Case: 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 US$175,000 from Vale and already has 21 projects under development. 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 SDGs, offering 10 scholarships. ITV invested BRL 402 million (US$80.4 million) in research projects and published more than 600 scientific articles in collaboration with universities, research centers, and other companies, supported 136 R&D projects. In order to prioritize the most cost-efficient low carbon technologies and R&D projects, Vale uses a Marginal Abatement Cost Curve (MACC).
Operations	Yes	For the physical risks of climate change, Vale has developed, in partnership with ITV impact, maps based on the analysis of the IPCC. These maps allow identifying the main changes in rainfall and temperature index throughout the country including in the regions in which Vale operates due to climate change. This tool helps in the management of physical risks in the operational areas. For example: 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. Environmental legislation is becoming more stringent around the world, which can lead to higher costs for compliance with environmental laws. Thus, in the medium-term, Vale will be in compliance with regulations and laws. This strategy is aligned with the Paris Agreement's to become a net zero mining company. Case: S: 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. T: 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%, contributing to GHG emission reductions. The dry processing cut water consumption by 93% and eliminates the need for tailing dams. A: See case study of risk #1 in C2.3a - #Description of response and explanation of cost calculation. It is worth noting that this project represents a major shift in production stream, thus, requiring large initial investments in the short-term. R: 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 2025 is to achieve 100% consume 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.

C3.4

(C3.4) 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 expenditures Capital allocation Acquisitions and divestments	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 its products and, consequently, revenues. 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 Vale's coal costumers. Climate change policies may continue to adversely impact coal demand on its 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. 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 Vale's net operating revenues from sales of coal decreased by 53.7% to US$473 million in 2020, from US$1.021 billion in 2019 (impact of US$548 million), as a result of deteriorated market conditions. This impact on its 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. Besides that, Vale have been looking beyond for a greener portfolio in the long term and a great example of that is the Tecnored 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. Direct costs: The price of greenhouse gas emissions affects Vale's operational direct costs, primarily through higher prices for fossil fuels, since mining is an energy-intensive industry and its international freight cost. In particular, the consumption of thermal coal, one of the products Vale 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. 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. This impact on Vale's direct cost is considered to be medium magnitude and the time horizon covered by the financial planning is long-term. 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. Indirect costs: Considering a future scenario, Vale faces the risk of energy shortages in countries where the company maintain operations and projects, 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 its operations, this cost is also related to carbon pricing, as well as the cost of fossil fuel production. 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 its revenues is considered to be medium-high magnitude and the time horizon covered by the financial planning is short-term. 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. Capital Allocation: Climate issues are considered in its 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 its portfolio, with the aggregate magnitude of the risk being low. 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/investiment's evaluation and approval. 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 financial planning is medium-term) to reduce its direct and indirect absolute emissions.

C3.4a

(C3.4a) Provide any additional information on how climate-related risks and opportunities have influenced your strategy and financial planning (optional).

n.a

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)
14100000

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]
9447000

Covered emissions in reporting year (metric tons CO2e)
10300000

% of target achieved [auto-calculated]
81.6677412422093

Target status in reporting year
Underway

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

Target ambition
Well-below 2°C aligned

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 net zero mining company: • To reduce the absolute emission of scopes 1 and 2 by 33% by 2030, aligned with the Paris Agreement's objective of limiting global warming to below 2ºC. This goal was defined based on the calculation tool of the Science Based Target Initiative (SBTI), and is therefore a level compatible with the limitation of the increase in global temperature of less than 2°C (scenario well below 2°C) and considered a science-based target. •To become net zero (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. Scope 1 direct emissions and Scope 2 indirect emissions Market-based totaled around 10.3 million tons of CO_2 equivalent in 2020, a reduction of 14.9% in relation to the previous year and of 27.2% in regards to 2017, the base year of Scope 1 and 2 reduction goal. The reduction in total emissions observed between 2019 and 2020 is due, especially, to the fact that the company still has a reflection in production volume as a result of the Brumadinho dam collapse and the Covid-19 pandemic effects. However, the emissions intensity per ton of iron ore equivalent in 2020 was 25.9 kg CO_2e/t MFe-eq. It was slightly lower than the intensity in the year 2017, which was 26.6 kg CO_2e/t MFe-eq. This shows that Vale's emissions profile is still strongly correlated to production, despite a marginal improvement in energy intensity. The company's emissions are also expected to peak by 2023, due to the 400 Mtpa expected production of iron ore capacity by the end of 2022. Thereafter, the absolute emission reduction trajectory and its consequent decouple from the production process will occur with the implementation of the new initiatives of larger scale emission reduction under development.

Target reference number
Abs 2

Year target was set
2020

Target coverage
Company-wide

Scope(s) (or Scope 3 category)
Other, please specify (Scope 3 net emission)

Base year
2018

Covered emissions in base year (metric tons CO2e)
586000000

Covered emissions in base year as % of total base year emissions in selected Scope(s) (or Scope 3 category)
100

Target year
2035

Targeted reduction from base year (%)
15

Covered emissions in target year (metric tons CO2e) [auto-calculated]
498100000

Covered emissions in reporting year (metric tons CO2e)
480500000

% of target achieved [auto-calculated]
120.022753128555

Target status in reporting year
New

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

Target ambition
2°C aligned

Please explain (including target coverage)
Vale's scope 3 emissions, annually calculated and verified by independent third parties, represents 98% of its total emissions and are not under its direct control. In 2020, Vale committed to a target to reduce scope 3 net emissions by 15% until 2035, with 2018 as baseline, which are based on development of new products, nature-based

solutions, partnership and engagement with clients and suppliers. The scope 3 target will be revised every five year, given the uncertainties regarding low carbon technologies and climate policies. Both targets are aligned with the Paris Agreement ambition. The fall in Scope 3 emissions by 18% in 2020 compared to 2018 (base year), is due to the reduction in sales, especially pellets by 27.7% and iron ore by 5.4%, justified by the production decrease and Vale's emissions profile strongly correlated to production. Despite of the 18% of reduction in Scope 3 achieved in 2020, Scope 3 emissions are expected to increase due to the production levels growth to ~400 Mtpa of iron ore.

C4.2

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

Target(s) to increase low-carbon energy consumption or production
Net-zero target(s)

C4.2a

(C4.2a) Provide details of your target(s) to increase low-carbon energy consumption or production.

Target reference number
Low 1

Year target was set
2019

Target coverage
Company-wide

Target type: absolute or intensity
Absolute

Target type: energy carrier
Electricity

Target type: activity
Consumption

Target type: energy source
Renewable energy source(s) only

Metric (target numerator if reporting an intensity target)
Percentage

Target denominator (intensity targets only)
<Not Applicable>

Base year
2017

Figure or percentage in base year
78

Target year
2030

Figure or percentage in target year
100

Figure or percentage in reporting year
87

% of target achieved [auto-calculated]
40.9090909090909

Target status in reporting year
Underway

Is this target part of an emissions target?
ABS1 (C4.1a question)

Is this target part of an overarching initiative?
Science-based targets initiative

Please explain (including target coverage)
In 2019 (for more information, see in question #C4.1a, column “Please explain”), 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 net zero mining company. The reduction of scope 2 emissions has an important contribution on this climate goals , as the company is comitted to consume 100% of electricity based on renewable energy sources. until 2030.

C4.2c

(C4.2c) Provide details of your net-zero target(s).

Target reference number
NZ1

Target coverage
Company-wide

Absolute/intensity emission target(s) linked to this net-zero target
Abs1
Abs2

Target year for achieving net zero
2050

Is this a science-based target?
Yes, and we have committed to seek validation of this target by the Science Based Targets initiative in the next 2 years

Please explain (including target coverage)
Vale is committed to leading the transition towards a net-zero mining industry. Vale is committed to contributing with solutions that will help limit the increase in the average global temperature to well below 2ºC, as set forth in the Paris Agreement. Vale endorsed and follow the Task Force on Climate related financial disclosures (TCFD) framework for risks and opportunities related to climate change. We have ambitious goals related to climate change risk management, including targets to reduce scopes 1 and 2 absolute emissions by 33% until 2030, with 2017 as baseline, and to become net zero by 2050. Vale recognizes that it can only lead the mining industry towards a low carbon economy if the company induce its value chain on the same direction. Vale's scope 3 emissions, annually calculated and verified by independent third parties, represents 98% of its total emissions and are not under our direct control. In 2020 Vale assumed the goal of reducing Scope 3 net emissions by 15% until 2035, compared to the base year of 2018. The reduction volume was defined based on the Science Based Target Initiative (SBTI) calculation tool, Absolute Contraction Approach method, so it is also considered a science-based target. The scope 3 target will be revised every five year, given the uncertainties regarding low carbon technologies and climate policies. Both targets are aligned with the Paris Agreement ambition.

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	353	
To be implemented*	6	602000
Implementation commenced*	7	23408
Implemented*	19	80638
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)
1058

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
Ongoing

Comment

n.a.

Initiative category & Initiative type

Energy efficiency in production processes	Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)
71597

Scope(s)
Scope 1

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
41582711

Investment required (unit currency – as specified in C0.4)
2619658

Payback period
<1 year

Estimated lifetime of the initiative
Ongoing

Comment
n.a.

Initiative category & Initiative type

Energy efficiency in production processes	Other, please specify (Mine infrastructure adjustments, which optimize fuel consumption)

Estimated annual CO2e savings (metric tonnes CO2e)
2868

Scope(s)
Scope 1

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
811819

Investment required (unit currency – as specified in C0.4)
0

Payback period
No payback

Estimated lifetime of the initiative
Ongoing

Comment
n.a.

Initiative category & Initiative type

Company policy or behavioral change	Resource efficiency

Estimated annual CO2e savings (metric tonnes CO2e)
4691

Scope(s)
Scope 1

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
946100

Investment required (unit currency – as specified in C0.4)
0

Payback period
No payback

Estimated lifetime of the initiative
Ongoing

Comment

n.a.

Initiative category & Initiative type

Company policy or behavioral change	Supplier engagement

Estimated annual CO2e savings (metric tonnes CO2e)
291

Scope(s)
Scope 3

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
119822

Investment required (unit currency – as specified in C0.4)
100000

Payback period
<1 year

Estimated lifetime of the initiative
Ongoing

Comment
n.a

Initiative category & Initiative type

Energy efficiency in buildings	Motors and drives

Estimated annual CO2e savings (metric tonnes CO2e)
522

Scope(s)
Scope 1

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
153912

Investment required (unit currency – as specified in C0.4)
0

Payback period
No payback

Estimated lifetime of the initiative
Ongoing

Comment
n.a

Initiative category & Initiative type

Energy efficiency in buildings	Lighting

Estimated annual CO2e savings (metric tonnes CO2e)
203

Scope(s)
Scope 2 (location-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
37971

Investment required (unit currency – as specified in C0.4)
128699

Payback period
1-3 years

Estimated lifetime of the initiative
Ongoing

Comment

n.a

Initiative category & Initiative type

Energy efficiency in buildings	Other, please specify (Automation)

Estimated annual CO2e savings (metric tonnes CO2e)
22032

Scope(s)
Scope 1

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
7222598

Investment required (unit currency – as specified in C0.4)
13516644

Payback period
1-3 years

Estimated lifetime of the initiative
Ongoing

Comment
n.a

C4.3c

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

Method	Comment
Compliance with regulatory requirements/standards	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. 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 Vale operate and fostering a safer and more sustainable Brazilian mining industry. 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 net zero mining company. To reduce 33% of the absolute emission of scopes 1 and 2 in 2030, aligned with the Paris Agreement to become net zero (scope 1 and 2) by 2050. 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. Vale suppliers considered key in terms of emissions in the supply chain are annually invited to participate in the CDP Supply Chain program.
Dedicated budget for low-carbon product R&D	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 contribution of $175 thousand dollars from Vale and an approved budget of $1.8 million dollars to finance 21 projects that are under development 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. ITV invested BRL 402 million (US$80.4 million) in research projects and published more than 600 scientific articles in collaboration with universities, research centers, and other companies, supported 136 R&D projects.
Employee engagement	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. Aligned with the Paris Agreement's objective of limiting global warming to below 2ºC, Vale linked the target of reduction 33% absolute scope 1 and 2 emission with the variable remuneration of all Vale's employees.
Internal incentives/recognition programs	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 integrates the variable remuneration of all Vale employees and impacts all hierarchical levels, up to the CEO. In 2020, goals related to the climate agenda represented 10% of Vale's employees' short-term variable remuneration, including its CEO and executive vice presidents. A goal composed of indicators of greenhouse gas emissions, forest recovery and protection, and renewable energy was also linked to leadership's long-term remuneration.
Marginal abatement cost curve	In order to prioritize the most cost-competitive initiatives to achieve Vale's 2030 target, Vale has drawn up a marginal abatement cost curve (MAC curve), which analyses more than 35 projects and it is constantly evolving.
Dedicated budget for energy efficiency	A large part of GHG emissions is directly linked to Vale's operations' energy consumption, so Vale knows that energy efficiency is a key factor for reducing GHG emissions and optimizing costs. Vale's Energy-Efficiency Program aims to include the topic of energy efficiency in a structured way into operational routines, making employees think systematically about initiatives that promote energy efficiency in their processes. This work is being developed globally through multidisciplinary groups in each operation and supported by Smart Energy, the platform responsible for managing electricity consumption throughout the company, providing automated energy-efficiency indicators. In addition to making a significant contribution to reducing GHG emissions, the Energy Efficiency Program also addresses ESG issues by creating indicators of energy intensity consumed by product, as well as by setting targets for increasing energy efficiency, which will occur throughout 2021. In 2022, with centralized governance and energy-efficiency indicators in the management routine, the goal is to obtain certification in ISO 50,001, the main international reference in energy management.
Dedicated budget for other emissions reduction activities	Vale Advances on the Climate Agenda and Unveils US$2 Billion to Reduce Carbon Emissions within the next ten years to reduce its direct and indirect absolute emissions (scopes 1 and 2) by 33% by 2030. In 2020, Vale spent approximately US$ 81 million with climate change initiatives.
Internal price on carbon	At the end of 2019, Vale adopted an internal carbon price of 50 dollars per ton of CO2 equivalent (US$50 / tCO2eq). This price is aligned to the temperature targets of the Paris Agreement, according to the recommendations of Carbon Pricing Leadership Coalition (CPLC). In June 2020, the use of the internal carbon price in economic-financial analysis of new investments started. The carbon price starts supporting the risk and opportunity assessment, selection and prioritization of projects, contributing to Vale's decarbonization trajectory.

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 2020, around 10.6% 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
10.6

% of total portfolio value
<Not Applicable>

Asset classes/ product types
<Not Applicable>

Comment
Climate change represents a scientifically proven reality and a challenge that affects not only its 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. Vale have been acting continuously, guided by scientific and practical references in line with its internal policies and standards, to deal with this issue. Moreover, there are other risks such as: steel demand may stagnate due to building retrofit, alternative options of urban mobility, assumed efficiencies down the value chain etc; possibility of arising a nickel-free battery may supress nickel demand; and recycling for both Nickel and Copper, where the significantly level of recycling is critical for the base metals strategy. However, the main emerging technologies in a low-carbon economy are based on direct reduction via low carbon hydrogen and CCUS associated with different commercials or innovators production routes. These technologies can differently impact its strategy for high quality products, pushing direct reduction pellets or downplaying the importance of high-quality materials if carbon capture massively succeeds. Furthermore, in order to reduce the use of coal, it is possible to expand the use and capacity of the electric arc furnace and/or even intensify the use of scrap in all processes.

C5. Emissions methodology

C5.1

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

Scope 1

Base year start
January 1 2017

Base year end
December 31 2017

Base year emissions (metric tons CO2e)
12423044.88

Comment
The 2017 emissions result is certified by a third party, and may be impacted by recalculations due to significant changes in boundaries, methodologies and data input errors, according to the GHG Protocol standard.

Scope 2 (location-based)

Base year start
January 1 2017

Base year end
December 31 2017

Base year emissions (metric tons CO2e)
1660968.1

Comment
The 2017 emissions result is certified by a third party, and may be impacted by recalculations due to significant changes in boundaries, methodologies and data input errors, according to the GHG Protocol standard.

Scope 2 (market-based)

Base year start
January 1 2017

Base year end
December 31 2017

Base year emissions (metric tons CO2e)
1660968.1

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 marked-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 Environmental Reporting Guidelines: Including streamlined energy and carbon reporting guidance, 2019
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
The Greenhouse Gas Protocol: Scope 2 Guidance
Other, please specify (NIR (National Inventory Report) 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)
9620730.44

Start date
<Not Applicable>

End date
<Not Applicable>

Comment
Vale Scope 1 emissions are calculated using the methodology recomended 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 - 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 2020, accounted by the Market Based methodology, totaled 0.63 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 2020, from the total energy contracted and consumed via GRID, by Vale's operations in Brazil, Vale deducted a total of 6.7 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
1019977.82

Scope 2, market-based (if applicable)
631027.94

Start date
<Not Applicable>

End date
<Not Applicable>

Comment
Vale Scope 2 emissions are calculated using the methodology recomended 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 - 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 as they are irrelevant to the Vale's inventory 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
Fugitive GHG emissions from fire extinguishers were estimated in 2017 and excluded from Vale's GHG Inventory as they are irrelevant to Vale's mining sector and 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
GHG combustion emissions from the use of acetylene were estimated in 2017 and excluded from Vale's GHG Inventory as they are irrelevant to Vale's mining sector and 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
1845447.21

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: "average-data". Activity data: Quantity of good and/or service purchased. Emission factors in tonnes of GHG per activity data. Methodology: quantity of capital good purchased 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
n.a

Capital goods

Evaluation status
Not relevant, calculated

Metric tonnes CO2e
10169.23

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: "average-data". Activity data: Quantity of capital good purchased. Emission factors in tonnes of GHG per activity data. Methodology: quantity of purchased good 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
This emissions category is considered not relevant or not material due to its representativeness in relation to the total of Scope 3 emissions. It represented 0.002% of Vale' Scope 3 in 2020. As a mining and metallurgical company, downstream emissions are more relevant for Vale than upstream emissions categories, as the products sold are processed or used by other companies in the manufacture of final products. And also due to the high volumes of commodities (products sold), the categories associated with transport and distribution, especially maritime transport, are also relevant.

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

Evaluation status
Relevant, calculated

Metric tonnes CO2e
1346907.86

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: "average-data". Activity data: Quantity of fuel purchased; quantity of electricity purchased and % 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 multipy 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
n.a

Upstream transportation and distribution

Evaluation status
Relevant, calculated

Metric tonnes CO2e
12450058.2

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: "fuel-based" and "distance-based". Activity data: quantity of fuel consumption; distance travelled (total) and vehicle efficiency; time spent and vehicle efficiency; quantity of material transported and distance between departure and arrival (one way). 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 distance travelled 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 between departure and arrival (one way) and by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners
100

Please explain
n.a

Waste generated in operations

Evaluation status
Not relevant, explanation provided

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

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
7331

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: “distance-based”. Activiy data: Flight distance by stretch and number of flights by stretch. Emission factors in tonnes of GHG per activity data. Methodology: distance by stretch (flight leg) 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
This emissions category is considered not relevant or not material due to its representativeness in relation to the total of Scope 3 emissions. It represented 0.002% of Vale' Scope 3 in 2020. As a mining and metallurgical company, downstream emissions are more relevant for Vale than upstream emissions categories, as the products sold are processed or used by other companies in the manufacture of final products. And also due to the high volumes of commodities (products sold), the categories associated with transport and distribution, especially maritime transport, are also relevant.

Employee commuting

Evaluation status
Not relevant, calculated

Metric tonnes CO2e
47319.7

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: “fuel-based”. 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
This emissions category is considered not relevant or not material due to its representativeness in relation to the total of Scope 3 emissions. It represented 0.01% of Vale' Scope 3 in 2020. As a mining and metallurgical company, downstream emissions are more relevant for Vale than upstream emissions categories, as the products sold are processed or used by other companies in the manufacture of final products. And also due to the high volumes of commodities (products sold), the categories associated with transport and distribution, especially maritime transport, are also relevant.

Upstream leased assets

Evaluation status
Not relevant, explanation provided

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

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
2360193.62

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: “fuel-based” and “distance-based”. Activity data: quantity of fuel consumption; distance travelled (total) and vehicle efficiency; time spent and vehicle efficiency; quantity of material transported and distance between departure and arrival (one way). 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 distance travelled 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 between departure and arrival (one way) and by the applicable emission factor.

Percentage of emissions calculated using data obtained from suppliers or value chain partners
100

Please explain
n.a

Processing of sold products

Evaluation status
Relevant, calculated

Metric tonnes CO2e
455221952.64

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: "average-data". Activity data: Quantity of sold product (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
n.a

Use of sold products

Evaluation status
Relevant, calculated

Metric tonnes CO2e
7240827.64

Emissions calculation methodology
Calculations methodologies consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard). Method: “direct use-phase”. Activity data: Quantity of sold product (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
n.a

End of life treatment of sold products

Evaluation status
Not relevant, explanation provided

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

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

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

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

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

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

Investments

Evaluation status
Not relevant, explanation provided

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

Please explain
In 2020, Vale estimated the emissions (scopes 1 + 2) associated with its investments, considering Vale's share (equity share). These emissions would represent less than 1% of Scope 3 in 2020 and therefore were considered non-material for the full Scope 3 accounting.

Other (upstream)

Evaluation status

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

Please explain

Other (downstream)

Evaluation status

Metric tonnes CO2e
<Not Applicable>

Emissions calculation methodology
<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>

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	482517.15	Despite of the relevant decrease in production, the biogenic emissions in 2020 were bigger than in 2019 due to increase of the biodiesel use in diesel mix consumed in Brasil and in Indonesia and also due to land-use change / management.

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
0.000256

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)
10521758

Metric denominator
unit total revenue

Metric denominator: Unit total
40018000000

Scope 2 figure used
Market-based

% change from previous year
20.1

Direction of change
Decreased

Reason for change
This indicator has decreased by 20.1% mainly due to relevant decrease in GHG emissions (scopes 1 + 2) in 2020 by 15% and reinforced by revenue increase by 6.5%. Compared to FY2017 the indicator has decreased by 38.2% both due to relevant decrease in GHG emissions (scopes 1 + 2) in 2020 by 27% and also to relevant revenue increase by 18%. The GHG reduction observed is due, especially, to the fact that the company still has a reflection in production volume as a result of the Brumadinho dam collapse and the Covid-19 pandemic effects. However, the emissions intensity per ton of iron ore equivalent in 2020 was was slightly lower than the intensity in the year 2017. This shows that Vale's emissions profile is still strongly correlated to production, despite of a marginal improvement in energy intensity.

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 CO2e)	GWP Reference
CO2	8766710.24	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	438340.17	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	366965.77	IPCC Fourth Assessment Report (AR4 - 100 year)
HFCs	43199.4	IPCC Fourth Assessment Report (AR4 - 100 year)
SF6	5514.86	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	5265255.55
Canada	479658.48
China	7148.2
Indonesia	2154708.43
Japan	7321.35
Malaysia	6899.63
Mozambique	786624.82
New Caledonia	213854.07
Oman	619474.01
Paraguay	35924.22
United Kingdom of Great Britain and Northern Ireland	43746.82
Other, please specify (International (Air space and waters))	114.86

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	3919364.73
Base Metals: Nickel, Copper and other products	3667425.75
Logistics Infrastructure: Railways and Ports	1219782.38
Coal	786624.82
Others (Aviation, Corporate, Energy - Biopalma, Mineral Research and "Reparação Brumadinho")	27532.76

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	27532.74	-22.910169	-43.173635
Corumbá Complex	17363.07	-19.187434	-57.607705
Itabira Complex	195358.92	-19.593315	-43.221606
Mariana Complex	86648.58	-20.20212	-43.445293
Vargem Grande Complex	112496.27	-20.236804	-43.864175
Paraopeba Complex	69369.56	-20.41899	-43.876104
Ferrosos Norte	508702.43	-6.059807	-50.167448
Serra Sul - S11D	115563.91	-6.411224	-50.341333
Ponta da Madeira Complex	461227.02	-2.574198	-44.342135
Tubarão Complex	1520053.67	-20.262567	-40.244273
Oman Operations	619474.01	24.511622	56.598384
Onça Puma	398317.73	-6.542229	-51.114634
PT Vale Indonesia	2154708.43	-2.568121	121.389641
Port Colborne Refinery	14009.72	42.879598	-79.237737
Sudbury Complex	329848.76	46.480663	-81.045879
Thompson Complex	20944.43	55.71292	-97.836879
Long Harbour Operations	41458.36	47.418623	-53.792404
Voisey's Bay Complex	73397.22	56.334705	-62.072704
Clydach Refinery	43746.82	51.693711	-3.889591
Matsuzaka Refinery	7321.35	34.604467	136.549806
Vale Nouvelle-Calédonie Operations	213854.07	-22.307823	166.927244
Dalian Refinery	7148.2	39.026029	121.812161
Salobo	240466.62	-5.794425	-50.531521
Sossego	122204.05	-6.433417	-50.069884
Moatize Complex	786624.82	-16.166062	33.807821
Carajás Railway (EFC)	878845.47	-2.56835	-44.346151
Vitória to Minas Railway (EFVM)	277673.88	-20.27682	-40.246181
Transbarge Navegacion (TBN)	35924.22	-25.278819	-57.637724
Barbacena's Ferroalloy Plant	85202.76	-21.202882	-43.816482
Ouro Preto's Ferroalloy Plant	23614.25	-20.418724	-43.552753
Simões Filho's Ferroalloy Plant	26272.67	-12.787931	-38.412447
Malaysia Distribution Center (Teluk Rubiah)	6899.63	4.170708	100.619682
Ilha de Guaíba's Terminal (TIG)	5556.86	-23.004488	-44.032523
Itaguaí's Terminal (CPBS)	661.88	-22.910695	-43.819408
New Steel	181.5	-22.615068	-43.309027
Água Limpa e Brucutu Complex	92046.55	-19.86914	-43.39307

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 CO2e	Net Scope 1 emissions , metric tons CO2e	Comment
Cement production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Chemicals production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Coal production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Electric utility activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Metals and mining production activities	7586790.48	<Not Applicable>	Emissions excluded: logistic services, coal and corporate offices.
Oil and gas production activities (upstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (midstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (downstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Steel production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport OEM activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport services activities	<Not Applicable>	<Not Applicable>	<Not Applicable>

C7.5

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

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)	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)
Brazil	412328.53	23378.65	6682796.25	6303887.83
Canada	41875.12	41875.12	1745451.09	0
China	16797.37	16797.37	25446.7	0
Indonesia	2499.16	2499.16	3396.98	0
Japan	8064.14	8064.14	14873	0
Malaysia	41747.8	41747.8	60547.94	0
Mozambique	13427.21	13427.21	207530.32	0
New Caledonia	228601.49	228601.49	253907.89	0
Oman	246373.66	246373.66	483464.8	0
Paraguay	0.01	0.01	138.89	0
United Kingdom of Great Britain and Northern Ireland	8263.33	8263.33	35443.66	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 CO2e)	Scope 2, market-based (metric tons CO2e)
Ferrous minerals: Iron ore and iron ore pellets, Ferroalloys and manganese	513585.67	267138.41
Base Metals: Nickel, Copper and other products	416073.87	306100.6
Logistics Infrastructure: Railways and Ports	76210.11	43940.33
Coal	13427.21	13427.21
Others (Aviation, Corporate, Energy - Biopalma, Mineral Research and "Reparação Brumadinho")	680.96	421.39

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	680.96	421.39
Corumbá Complex	894.59	894.59
Itabira Complex	73792.85	0
Mariana Complex	5436.03	0
Vargem Grande Complex	16568.48	0
Paraopeba Complex	10426.43	0
Ferrosos Norte	29761.44	0
Serra Sul - S11D	17361.45	0
Ponta da Madeira Complex	32601.5	37.29
Tubarão Complex	69483.81	0
Oman Operations	246373.66	246373.66
Onça Puma	34404.56	0
PT Vale Indonesia	2499.16	2499.16
Port Colborne Refinery	774.05	774.05
Sudbury Complex	32895.73	32895.73
Thompson Complex	0	0
Long Harbour Operations	8205.34	8205.34
Voisey's Bay Complex	0	0
Clydach Refinery	8263.34	8263.33
Matsuzaka Refinery	8064.14	8064.14
Vale Nouvelle-Calédonie Operations	228601.49	228601.49
Dalian Refinery	16797.37	16797.37
Salobo	54280.92	0
Sossego	21287.79	0
Moatize Complex	13427.21	13427.21
Carajás Railway (EFC)	603.01	603.01
Vitória to Minas Railway (EFVM)	1476.67	1476.67
Transbarge Navegacion (TBN)	0.01	0.01
Barbacena's Ferroalloy Plant	13301.8	13301.8
Ouro Preto's Ferroalloy Plant	3569.9	3569.9
Simões Filho's Ferroalloy Plant	3055.01	3055.01
Malaysia Distribution Center (Teluk Rubiah)	41747.8	41747.8
Ilha de Guaíba's Terminal (TIG)	1860.55	0
Itaguaí's Terminal (CPBS)	1305.46	0
New Steel	18.99	18.99
Água Limpa e Brucutu Complex	20156.32	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 CO2e	Scope 2, market-based (if applicable), metric tons CO2e	Comment
Cement production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Chemicals production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Coal production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Metals and mining production activities	929659.54	573239.01	Emissions excluded: logistic services, coal and corporate offices
Oil and gas production activities (upstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (midstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (downstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Steel production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport OEM activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport services activities	<Not Applicable>	<Not Applicable>	<Not Applicable>

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 CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	13585	Decreased	0.11	The share of energy certificates from renewable sources over total energy purchased increased by 2.5% in FY2020 compared to FY2019. The increase in renewable energy certificates contributed to 0.11% of the change. Calculation: (13,585 / 12,047,000)*100 = 0.11%. The value reported, 13,585 tCO2e, is calculated by maintaining the share of energy certificates of FY2019 applied to FY2020.
Other emissions reduction activities	103756	Decreased	0.86	Emission reductions initiatives as reported in question C4.3b contributed to 0.86% of the change. Calculation: (103,756 / 14,084,000)*100 = 0.86%
Divestment	84542	Decreased	0.7	In November 2020, we sold 100% of the shares of Biopalma da Amazônia S.A—Reflorestamento, Indústria e Comércio to Brasil Bio Fuels Pará Ltda., a company from the Brasil Bio Fuels S.A. group, resulting in the total divestment of our palm oil business. The value reported refers to Biopalma Scope 1 and 2 emissions, 84.542 tCO2e in 2020. Calculation: (84,542 / 12,047,000)*100 = 0.70%.
Acquisitions	23138	Increased	0.19	In August 2019, we concluded the acquisition of Ferrous Resources Limited, a company that owns and operates iron ore mines near our operations in Minas Gerais. However, it was only possible to account for their emissions in 2020. The value reported refers to Mina Viga Scopes 1 and 2 emissions, 23.138 tCO2e in 2020, from Ferrous acquisition. Calculation: (23,138 / 12,047,000)*100 = 0.19%.
Mergers	0	No change	0	No change in emissions.
Change in output	537656	Decreased	4.46	Decrease in production volumes contributed to -4.46% of the change in emissions from FY2019 to FY2020. Calculation: (537,656 / 12,047,000)*100 = 22.76%. Where the emissions reduction, 537,656 tCO2e, are calculated based on the emissions intensity for FY2020 (25,7 kgCO2eq / tMFe-eq) and the difference in production volume between FY2020 and FY2019 (398,5 - 419,4 = -21 Million tons MFe-eq). Calculation: (25,7* 21)*1000 = 537,656 tCO2e. The reduction in total emissions observed between 2019 and 2020 is due, especially, to the fact that the company still has a reflection in production volume as a result of the Brumadinho dam collapse and the Covid-19 pandemic effects. Note: The iron ore equivalent (MFe-eq) indicator takes the production of iron ore, our main product, as a parameter to account for the production of the company's other products, such as coal, nickel and copper. Therefore, all our production is converted into tons of iron ore equivalent. The indicator of emissions per equivalent iron ore, on the other hand, is an indicator used only to monitor the emissions profile and not for determining the emissions reduction target of scopes 1 and 2.
Change in methodology	116091	Increased	0.96	The remainder change in emissions from FY2019 to FY2020 were allocated to "Change in methodology" due to annual revision of emission factors. Calculation: (116,091 / 12,047,000)*100 = 0.96%.
Change in boundary	0	No change	0	No change in emissions.
Change in physical operating conditions	0	No change	0	No change in emissions.
Unidentified	0	No change	0	No change in emissions.
Other	1194665	Decreased	9.92	Decrease in emissions intensity in FY2020 (25.7 kgCO2e / tMFe-eq) contributed to -9.92% of the emissions change compared to FY2019 (28.7 kgCO2e / tMFe-eq). Calculation: (1,194,665 / 12,047,000)*100 = -9.92%. Where the emissions reduction, 1,194,665 tCO2e, are calculated based on the volume of production in FY2020 (398.5 million tMFe-eq) and the difference in emissions intensity from FY2020 to FY2019 (25.7 - 28.7 = 3.0 kgCO2e / tMFe-eq). Calculation: (~398.5 * 3.0)*1000 = 1,194,665 tCO2e. Note: The iron ore equivalent (MFe-eq) indicator takes the production of iron ore, our main product, as a parameter to account for the production of the company's other products, such as coal, nickel and copper. Therefore, all our production is converted into tons of iron ore equivalent. The indicator of emissions per equivalent iron ore, on the other hand, is an indicator used only to monitor the emissions profile and not for determining the emissions reduction target of scopes 1 and 2.

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?

Market-based

C8. Energy

C8.1

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

More than 5% but less than or equal to 10%

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)	1261401.06	25946193.21	27207594.27
Consumption of purchased or acquired electricity	<Not Applicable>	7902920.27	1610077.25	9512997.52
Consumption of purchased or acquired heat	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired steam	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired cooling	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	2735126.6	<Not Applicable>	2735126.6
Total energy consumption	<Not Applicable>	11899447.93	27556270.46	39455718.39

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)	21431424.57
Consumption of purchased or acquired electricity	<Not Applicable>	8675197.77
Consumption of purchased or acquired heat	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired steam	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired cooling	<Not Applicable>	<Not Applicable>
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	2735126.6
Total energy consumption	<Not Applicable>	32841748.94

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	No

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
1250922.93

MWh fuel consumed for self-generation of electricity
3683.77

MWh fuel consumed for self-generation of heat
1246178.7

MWh fuel consumed for self-generation of steam
1060.46

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
70.77

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
n.a

Fuels (excluding feedstocks)
Biogasoline

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
10478.13

MWh fuel consumed for self-generation of electricity
2.97

MWh fuel consumed for self-generation of heat
10475.16

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
70.77

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
n.a

Fuels (excluding feedstocks)
Anthracite Coal

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
3210314.89

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
3210314.89

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
98.27

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
n.a

Fuels (excluding feedstocks)
Coal

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
602894.7

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
602894.7

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
94.6

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
n.a

Fuels (excluding feedstocks)
Subbituminous Coal

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
2358488.47

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
2358488.47

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
96.07

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
n.a

Fuels (excluding feedstocks)
Diesel

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
11039110.42

MWh fuel consumed for self-generation of electricity
260527.71

MWh fuel consumed for self-generation of heat
10648643.14

MWh fuel consumed for self-generation of steam
129939.57

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
74.07

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
n.a

Fuels (excluding feedstocks)
Jet Kerosene

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
24007.17

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
24007.17

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
71.5

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
n.a

Fuels (excluding feedstocks)
Kerosene

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
2657.78

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
2657.78

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
71.87

Unit
lb 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
n.a

Fuels (excluding feedstocks)
Liquefied Petroleum Gas (LPG)

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
148016.34

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat

148016.34

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
63.07

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
n.a

Fuels (excluding feedstocks)
Motor Gasoline

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
26399.3

MWh fuel consumed for self-generation of electricity
11.62

MWh fuel consumed for self-generation of heat
26387.67

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
69.3

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
n.a

Fuels (excluding feedstocks)
Natural Gas

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
5090493.29

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
5042235.45

MWh fuel consumed for self-generation of steam
48257.83

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
56.1

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
n.a

Fuels (excluding feedstocks)
Other, please specify (Coke and Petroleum coke)

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
12617.87

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
12617.87

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

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
n.a

Fuels (excluding feedstocks)
Light Distillate

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
11260.03

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
11260.03

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
70.22

Unit
kg CO2 per GJ

Emissions factor source
NIR 2020. National Inventory Report 1990 –2018: Greenhouse Gas Sources and Sinks In Canada. Part 2 - Table A4–2 Reference Approach Energy Conversion and Emission Factors for Canada.

Comment
n.a

Fuels (excluding feedstocks)
Other, please specify (Residual Fuel Oil Brazil)

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
843233.93

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
843233.93

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

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
n.a

Fuels (excluding feedstocks)
Residual Fuel Oil

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
2197552.55

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
2197552.55

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

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
n.a

Fuels (excluding feedstocks)
Marine Fuel Oil

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
340792.18

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
340792.18

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
77.46

Unit
kg CO2 per GJ

Emissions factor source
IMO, Fourth GHG Study 2020 - Table 27 – Emissions factors used in this study for top-down estimation

Comment
n.a

Fuels (excluding feedstocks)
Propane Gas

Heating value
LHV (lower heating value)

Total fuel MWh consumed by the organization
38354.29

MWh fuel consumed for self-generation of electricity
0

MWh fuel consumed for self-generation of heat
38354.29

MWh fuel consumed for self-generation of steam
0

MWh fuel consumed for self-generation of cooling
<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration
<Not Applicable>

Emission factor
63.07

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
n.a

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	2864510.01	2864510.01	2771973.69	2771973.69
Heat	27.01	27010543.78	0	0
Steam	179393.94	179393.94	1060.46	1060.46
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	2864510.01	2864510.01
Heat	21234374.07	21234374.07
Steam	179393.94	179393.94
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/area of consumption of low-carbon electricity, heat, steam or cooling
Brazil

MWh consumed accounted for at a zero emission factor
6303887.83

Comment
Scope 2 emissions in 2020, accounted by the Market Based methodology, totaled 0.63 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 2020, from the total energy contracted and consumed via GRID, by Vale's operations in Brazil, Vale deducted a total of 6,3 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
0.3

Metric numerator
11.899.447,93

Metric denominator (intensity metric only)
39.455.718,39

% change from previous year
6.7

Direction of change
Increased

Please explain
The indicador is related to renewable energy usage at Vale. Formula = RE/(RE + NR), where RE: renewable energy and NR: non-renewable energy consumed. Explanation: The increase in the share of renewables in 2020 when compared to 2019, is justified by the reduction in energy consumption of non-renewable energy sources, especially natural gas and coal. This was especially true for pellet production, which was 29% lower than 2019 as a result of lower pellet feed availability at Vale sites and production adjustments due to market conditions.

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
290000

Production, metric tons
260500

Production, copper-equivalent units (metric tons)
260500

Scope 1 emissions
362670.68

Scope 2 emissions
0

Scope 2 emissions approach
Market-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 2018 to 2020 = 1.000

Comment
It includes the GHG emissions from Brazilian copper operations (Salobo and Sossego), comprising mine and processing plants to produce copper concentrate

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Output product
Iron ore

Capacity, metric tons
527432743

Production, metric tons
300385000

Production, copper-equivalent units (metric tons)
5211323

Scope 1 emissions
3778385.2

Scope 2 emissions
246863.81

Scope 2 emissions approach
Market-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 2018 to 2020 = 0.0173

Comment
It includes the GHG emissions from iron ore mines in Brazil, which we refer to as the Northern, Southeastern, Southern and Midwestern Systems. Northern System comprises Serra Norte, Serra Leste and Serra Sul mines. The Southeastern System comprises three mining complexes: Itabira, Mariana and Minas Centrais. The Southern System comprises two major mining complexes: Vargem Grande and Paraopeba. The Midwestern System comprises two mines and two plants.

Output product
Other mining (Please specify) (Manganese ore)

Capacity, metric tons
4976000

Production, metric tons
740000

Production, copper-equivalent units (metric tons)
<Not Applicable>

Scope 1 emissions
7483.08

Scope 2 emissions
414.94

Scope 2 emissions approach
Market-based

Pricing methodology for copper-equivalent figure
<Not Applicable>

Comment
It includes the GHG emissions from Morro da Mina, Mina Urucum e Mina do Azul. Production, copper-equivalent units (metric tons): 18.251 Pricing methodology for copper-equivalent figure : Manganese conversion factor for the calculation of the copper-equivalent figure: Manganese average price divided by copper average price for the period of 2018 to 2020 = 0.0247

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)
412000

Production (metric tons)
214700

Annual production in copper-equivalent units (thousand tons)
547108

Scope 1 emissions (metric tons CO2e)
3304755.07

Scope 2 emissions (metric tons CO2e)
306100.6

Scope 2 emissions approach
Market-based

Pricing methodology for-copper equivalent figure
Nickel conversion factor for the calculation of the copper-equivalent figure: Nickel average price divided by copper average price for the period of 2018 to 2020 = 2.5482

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

Output product
Other ferrous metals (Please specify) (Manganese ferroalloys)

Capacity (metric tons)
265000

Production (metric tons)
73000

Annual production in copper-equivalent units (thousand tons)
13768

Scope 1 emissions (metric tons CO2e)
133469.45

Scope 2 emissions (metric tons CO2e)
19859.66

Scope 2 emissions approach
Market-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 2018 to 2020 = 0.1886

Comment
It includes the GHG emissions from ferroalloy production. The decrease in emissions in FY2020 was due to stoppage in Simões Fillho plant.

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	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. 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 Tropical Regions master's program. ITV invested BRL 402 million (US$80.4 million) in research projects and published more than 600 scientific articles in collaboration with universities, research centers, and other companies, supported 136 R&D 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.

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%	1800	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. Until 2020, 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.
Unable to disaggregate by technology area	<Not Applicable>	81 - 100%	80400	Vale is consistently focused on improving its processes throughout research and development (R&D) projects. Vale Technological Institute (ITV), founded in 2010, 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. In 10 years (2010 – 2020) ITV published over 450 scientific papers; have been 36 researchers; had about 100 scholarship students and established network of employees in Brazil and abroad. ITV invested BRL 402 million (US$80.4 million) in research projects and published more than 600 scientific articles in collaboration with universities, research centers, and other companies, supported 136 R&D 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).

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
2020_CDP-verification-template_VALE_revVale (003).pdf

Page/ section reference
Pages 1 to 3

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
2020_CDP-verification-template_VALE_revVale (003).pdf

Page/ section reference
Pages 1 to 3

Relevant standard
ISO14064-3

Proportion of reported emissions verified (%)
100

Scope 2 approach
Scope 2 market-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
2020_CDP-verification-template_VALE_revVale (003).pdf

Page/ section reference
Pages 1 to 3

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
2020_CDP-verification-template_VALE_revVale (003).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	A third-party certification company (Bureau Veritas Certification Brazil) was engaged by Vale S.A. (Vale), to conduct and independent assurance of its Integrated Report for the year of 2020. The scope encompassed the Standards and Principles of the Global Report Initiative™ for Sustainability Reports, including GRI's Mining and Metals Sector Disclosures (2013), and covered the period between January 1 and December 31, 2020. The level of verification adopted was Limited, according to the requirements of the ISAE 3000 Standard, which were incorporated to the internal assessment protocols of Bureau Veritas. Please access page 160, Vale 2020 Integrated Report for more information: http://www.vale.com/brasil/pt/business/reports/siteassets/relato-integrado-2020/assets/docs/vale_integrated_report_2020.pdf vale_integrated_report_2020.pdf
C8. Energy	Energy consumption	GRI Sustainability Reporting Standards and International Standard on Assurance Engagements (ISAE) 3000	A third-party certification company (Bureau Veritas Certification Brazil) was engaged by Vale S.A. (Vale), to conduct and independent assurance of its Integrated Report for the year of 2020. The scope encompassed the Standards and Principles of the Global Report Initiative™ for Sustainability Reports, including GRI's Mining and Metals Sector Disclosures (2013), and covered the period between January 1 and December 31, 2020. The level of verification adopted was Limited, according to the requirements of the ISAE 3000 Standard, which were incorporated to the internal assessment protocols of Bureau Veritas. Please access page 160, Vale 2020 Integrated Report for more information: http://www.vale.com/brasil/pt/business/reports/siteassets/relato-integrado-2020/assets/docs/vale_integrated_report_2020.pdf vale_integrated_report_2020.pdf
C4. Targets and performance	Other, please specify (Analysis of the Emission Reduction Targets)	Independent third-party analysis not based on verification standards	A third-party certification company (Bureau Veritas Certification Brasil) was engaged by Vale S.A. (Vale), to conduct an independent analysis of its Emission Reduction Targets. The scope was to present a third-party understanding of the method Vale has defined its targets, but not aim to verify whether the targets defined by Vale are aligned with the criteria established by Science Based Target Initiative (SBTI). Vale has used SBTi calculation tools, the Absolute Contraction Approach method, to define the % of reduction for their Scope 1 and 2, and Scope 3 targets. Declaração de Análise Independente_final_e.pdf

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

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

January 1 2020

Period end date

December 31 2020

% of total Scope 1 emissions covered by tax

0.62

Total cost of tax paid

1789297

Comment

In 2020, the Federal Government of Canada is charging USD$30/tCO2e.

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, Vale 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. One of the internal tools adopted to operationalize the Vale Net-Zero Strategy is carbon pricing, recently implemented at Vale. Vale has adopted an internal carbon price (shadow price) of USD 50 per ton of CO2 equivalent, applicable for economic-financial analysis of current and capital investments, utilized in Marginal Abatement Cost Curve (MACC) and projects prioritization. Vale's methodology for carbon pricing is applicable for all projects and investments (Current and Capital) that have GHG emission associated to its operation and/or will be responsible for the deforestation of native forest during its implantation encompassing Vale's units globally. The methodology started to be used in June 2020 and aims to help prioritize the most competitive project alternative to achieve the 2030 carbon emission target. This price is aligned to the temperature targets of the Paris Agreement, according to the recommendations of Carbon Pricing Leadership Coalition (CPLC). 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 net zero mining company. 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 2ºC. This target is linked to the variable remuneration of all Vale's employees. Vale aims to reduce 15% of its scope 3 net emissions by 2035, to encourage clients and suppliers in the same direction and aligned with its net zero commitment. Through active engagement with clients from the steel and metallurgy industries, Vale will work to reduce emissions in its value chain. The company will guide its operations based on win-win relationships, less intensive products, and new technologies. The Low Carbon Forum was also created to manage the implementation of the Vale Net Zero strategy. The Forum is coordinated by the Sustainability Executive Committee with the support of the Executive Committees: 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. Vale 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 Vale 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. Vale currently has 30 battery-powered vehicles operating as part of the Green Energy Vehicles test program and by the end of 2021 there will be more than 40. One of Vale's largest fleets of battery-powered electric vehicles is housed at the Creighton mine. This fleet is known as the GEV pilot project. Vale expects to see a decrease in diesel fuel consumption as its 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, applicable for economic-financial analysis of current and capital investments, utilized in Marginal Abatement Cost Curve (MACC) and projects prioritization. Vale's methodology for carbon pricing is applicable for all projects and investments (Current and Capital) that have GHG emission associated to its operation and/or will be responsible for the deforestation of native forest during its implantation encompassing Vale's units globally. The methodology started to be used in June 2020 and aims to help prioritize the most competitive project alternative to achieve the 2030 carbon emission target.

Actual price(s) used (Currency /metric ton)
50

Variance of price(s) used
Static pricing: a price that is constant over time

Type of internal carbon price
Shadow price

Impact & implication
Throughout 2019 Vale has developed a proprietary carbon pricing methodology to assess risks linked to climate change, by projecting possible impacts on the operating costs of each business unit. Vale's Carbon pricing methodology was implemented on June 1,2020. The methodology is applicable to projects and investments (current and capital) and is composed by three main steps beginning with Quantification of GHG emissions. With carbon accounting finished, carbon is monetized using the shadow price generating the emission cost, the emission cost is than included in the project financial indicators and results. In this context Vale developed a carbon pricing manual and did an internal training to support the project leaders and developers to apply carbon pricing in projects evaluations. The first business case implemented in 2020 was the New Steel Project, a dry iron ore concentration unit, located in Vargem Grande Complex in the city of Nova Lima, in the state of Minas Gerais. The project is expected to be the world's first industrial-scale dry magnetic fines concentration, with total expected multi-year investments of US$125 million. A synergy between New steel concentrating plant and briquetting aims to reduce fuel consumption, in the evaluation steps this project has two fuel alternatives:1) Natural Gas; 2) Charcoal. The alternatives were analised and carbon pricing was applied in the evaluation. The Results obtained in carbon pricing processes for New Steel shown alternative two as the most appropriate due it's lowest carbon emission and others financial indicators.

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
61

% total procurement spend (direct and indirect)
62

% of supplier-related Scope 3 emissions as reported in C6.5
3.3

Rationale for the coverage of your engagement
Vale's 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 its shareholders in relation to our choice of suppliers. Since 2011, Vale promoting better emissions management in our value chain through a voluntary contractual clause and an annual questionnaire on Greenhouse Gases (GHG) applied for critical suppliers (suppliers with hight emission rates). In 2020, Vale inserted a mandatory clause for critical suppliers' contracts associated with an annual request for information on the management of Climate Change, through adherence to the CDP Supply Chain.

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 for this purpose Vale established a goal for scope 3 that aims to reduce 15% of its scope net emissions by 2035, to encourage clients and suppliers in the same direction. Measuring success: Among the initiatives already implemented we can highlight the inclusion of contractual clauses related to greenhouse gas management for suppliers with invite to the CDP Supply Chain. Vale suppliers considered key in terms of emissions in the supply chain are annually invited to participate in the CDP Supply Chain program. This strategy was designed to implement the Programme on a pilot basis over three years (2020-2022), to measure the evolution of the main suppliers in emissions management. In the first year the objective was to establish a baseline for future measurements, and therefore the measure of success of the programme was to include the largest number of suppliers of critical categories in the initiative. As result in the first year we had a representative result where 55% of the invited five hundred companies (274) submitted their answer. These companies combined represent 63% of spend purchased with in categories classified as critical in 2019 and in CDP's analysis this is an excellent number. In addition, it represents a 30% increase over the companies that submitted the Vale questionnaire in 2019.

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 2020, these emissions totalled approximately 480 million tCO2e in the year, a result 14.6% lower than in 2019. 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
55

% total procurement spend (direct and indirect)
77

% of supplier-related Scope 3 emissions as reported in C6.5
30

Rationale for the coverage of your engagement
About five hundred of Vale suppliers considered key in terms of supply chain emissions were invited to join the CDP Supply Chain program in 2020. Vale has been reporting information on climate change through the CDP for 14 years. The company will now join other 120 companies that use this internationally recognized, standardized reporting platform that provides technical support for engaging strategic suppliers on environmental issues, especially on climate change.

Impact of engagement, including measures of success
An example of engagement impact is aligned the business portfolio to the transition to a low carbon economy, leveraging new business opportunities and raise the awareness of suppliers regarding climate change and engage them to improve their emission management. From five hundred suppliers invited in 2020 about 274 submissions were done resulting an answer rate of 55% an excellent number for the first year of engagement.

Comment
n.a.

C12.1d

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

Combating the impacts of climate change is a strategic priority on Vale's agenda. Mining activity is highly dependent on logistical infrastructure, sensitive to extreme climate risks. Case: S - Vale reviewed in 2019 its climate change goals including new commitments to reduce greenhouse gas (GHG) emissions aiming to become a net zero mining company. A - To achieve Climate Change Internal Goals and face this global challenge Vale, Rio Tinto and BHP have become together as Founding Patrons to use the Innovation Hub to define and promote the Charge On Innovation Challenge, in order to develop effective solutions for mine electrification and decarbonisation. The Charge on Innovation Challenge asks Vendors to present interoperable solutions that can safely deliver electricity to large battery-electric off-road haul trucks in a way that maintains or improves current productivity levels. T - The mains objective of this project is to reduce carbon emissions for the mining operations by electrifying their vast mining truck fleets. Specifically, Vale wants mechanisms capable of delivering in the order of 400kWh of electricity to each truck within a haul cycle (ie load, travel, dump, return, queue). The delivered electricity is to charge a battery, and if applicable directly propel the truck. R - The challenge is open to vendor across all industries globally and funders expect as a result: to demonstrate there is an emerging market for charging solutions in mining; accelerate commercialization of solutions; indicate to suppliers, the mining industry seeks interoperable solutions; maintain multiple actors and competition in the supply chain; integrate innovations from other sectors into the mining sector and utilize collective wisdom from across mining companies to identify workable solutions. Now vendors registration are open on Challenge website (https://chargeoninnovation.com/) and the Next step is to evaluate innovative ideas collected.

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
Other, please specify (Brazilian Carbon Pricing)	Support	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.	Vale supports the initiative with no exceptions.
Other, please specify (IMO strategy for reducing GHG)	Support	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.	Vale supports proposals focused on energy efficiency and climate goals to the achievement of the IMO GHG emissions reductions targets.
Mandatory carbon reporting	Support	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.	Vale supports the establishment of a mandatory report of fuel consumptions from ships.
Other, please specify (Canada Federal Carbon Pricing) *Federal Backstop Program on Carbon Pricing*	Support with minor exceptions	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.	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.
Other, please specify (Cancellation Ontario CaT) *Cancellation of the Ontario Cap-and-trade program*	Oppose	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.	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.
Cap and trade	Support	Manitoba Cap-and-trade: Manitoba is planning to implement a flat carbon price of $25 per tonne CO2e.	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.
Other, please specify (Newfoundland and Labrador – GHG Act) *Newfoundland and Labrador Carbon pricing – Greenhouse Gas Act*	Support	A made in Newfoundland and Labrador carbon pricing framework is being developed by the provincial government.	Vale is still waiting on specific developments by the government of Newfoundland and Labrador.
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.

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. Vale contributes 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. Vale 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. Vale is on the Executive Committee and also the Management Committee (delegated working committee that sets the direction of the group). Vale 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 Vale is 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 Vale's 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. Vale has acting continuously, guided by scientific and practical references aligned with its 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 Vale operates 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 Net Zero 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, Vale participated 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. Vale 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, Vale defined a governance structure to manage net zero 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 Vale increased its 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
form_20f_2020.pdf

Page/Section reference
Vale's Environmental, Social and Governance (ESG) Framework (page 14 and 15); Risks Factors (page 41 and 42); Environmental Regulations (pages 92 to 94).

Content elements
Strategy
Risks & opportunities
Emission targets

Comment
n.a.

Publication
In mainstream reports, incorporating the TCFD recommendations

Status
Complete

Attach the document
vale_integrated_report_2020.pdf

Page/Section reference
ESG Strategy - Material Topic - Climate Change (page 49); Progress on the 2030 Commitments - Climate Change, Energy and Forests (Pages 52 to 53); Governance (pages 59 to 62); Risk Management (pages 68 to 70); Climate change and GHG emissions (pages 105 to 110); Energy and energy efficiency (pages 111 and 112); Risk and Opportunities in Climate Change (pages 113 to 115); Climate Change Scenarios (page 116).

Content elements
Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other, please specify (Energy metrics and targets)

Comment
n.a.

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
Vale ESG Portal - Climate Change: http://www.vale.com/esg/en/Pages/ClimateChange.aspx

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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.

n.a

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	Chief Executive Officer (Executive President)	Chief Executive Officer (CEO)

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
I am submitting my response	Investors Customers	Public

Please confirm below

I have read and accept the applicable Terms