



Report on Social, Environmental and Climate-related Risks and Opportunities

Volume 2 | December 2022





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Preface

It is with great pleasure that the Banco Central do Brasil (BCB) makes public its second Report on Social, Environmental and Climate-related Risks and Opportunities. This report strengthens the transparency of BCB's actions in its sustainability agenda as well as reinforces its commitment to confront these risks within its institutional mandate.

BCB's mission is to ensure the stability of the currency purchasing power, to foster a sound and competitive financial system, and to promote the economic well-being of society. Central banks have increasingly included climate events in their analyses because of their effect on price stability and monetary policy. In 2021, Brazil witnessed a drought that affected its energy matrix, increasing the cost of energy and impacting inflation. In addition, there were crop losses, with significant impacts on the reimbursements through the Program to Guarantee Agricultural and Livestock Activity (Proagro), as well as damage to the uninsured. These are concrete examples of the economic and financial impacts related to the mission of the BCB.

Social and environmental responsibility is a corporate value that has long been present in our internal practices, as well as in the regulation and supervision activities of the Brazilian National Financial System (SFN). Particularly in the last decade, the BCB has moved forward issuing regulation aiming to promote the integration of social and environmental risk factors within the risk analysis of financial institutions (FIs). As governments and private sectors worldwide started to formalize social, environmental and climate issues into their activities, it became clear that the BCB's early movement was correct. However, the work of the monetary authority in putting forward prudential rules and inducing best (and necessary) sustainability practices is just beginning.

Indeed, from the environmental and climate perspective, adaptations to a wide range of economic activities will be necessary. This transition will certainly not happen overnight and, considering production and consumption dynamics, new economic sectors should emerge while others disappear. It is BCB's responsibility to remain vigilant in the monitoring and controlling of risks that could compromise its mission during the transition, as well as the potential economic effects of evermore frequent extreme climate events.

This time of awareness of climate and environmental risks also brings about important opportunities. Brazil is extremely privileged when it comes to environmental and climate varieties. We have vast biomes rich in animal and plant

biodiversity, in addition to cutting edge technology in the agriculture and livestock businesses. Supported by an advanced financial system that is capable of swiftly and efficiently providing funding to these sectors, the transition to a low-carbon economy can undoubtedly be beneficial to Brazil's economic development.

Embracing these much-needed changes towards a better environmental future, we think it is appropriate to also move forward in topics equally relevant in the social agenda. BCB supports financial citizenship through the democratization of financial knowledge, wide access to the financial system, and options for efficient and widespread credit allocation. In order to achieve these goals, the BCB invests in partnerships for the dissemination of financial education. It also constantly implements new technological solutions for the public and financial system and promotes the modernization in areas such as microcredit, cooperatives, currency convertibility, and capital markets. Moreover, the BCB recognizes the importance of reducing social disparities and, within the institution, of promoting equal opportunities and treatment of its workforce. After all, the dignity, prosperity and welfare of society as a whole are undoubtedly a relevant part of the equation.

Fortunately, the BCB is not alone in dealing with the several challenges laid out in this report. Since 2017, central banks worldwide have joined in a formal network, the Network for Greening the Financial System (NGFS), to promote a greener financial system, boosting the important exchange of experiences, doing studies, and discussing best practices. BCB joined the NGFS in January 2020, and in January 2022 it became a member of its Steering Committee for a two-year term. There is a great coordinated global effort towards the identification and quantification of risks and opportunities that allow for effective action to reduce inequalities and reach a more balanced relationship between economic activity and nature. Although there is still not an established metric, a body of knowledge that is gradually taking shape should help us move forward. This report already covers some initial metrics and measures, and others will surely be incorporated as a consensus on measuring and disclosing these risks evolves.

Finally, this report represents an important managerial instrument for the BCB and an accountability one to society, giving transparency to its actions. The themes highlighted are on the frontier of knowledge, which is where central banks must be. Research, data generation and a common understanding of the best practices will result in the evolution of the report in each new edition. I hope that the report is useful and informative of the many challenges and opportunities around the corner, the solutions of which depend on us, individual, organizations and governments.

Roberto de Oliveira Campos Neto
Governor of Banco Central do Brasil

Executive Summary

This report presents an integrated view of BCB initiatives related to social, environmental and climate risks and opportunities. These risks and opportunities are linked to environmental, social and governance (ESG) factors, including the risks and opportunities associated to climate change, which may impact the BCB, the Brazilian National Financial System and the Brazilian economy.

The economic and financial relevance of ESG factors, including climatic issues, is well known. This is especially true for Brazil. As an example, we can cite the drought that occurred in 2021, which affected the domestic energy matrix and had an impact of 0.67 p.p.¹ on inflation. The drought in the south of the country also led to the agricultural loss of roughly R\$ 45.3 billion² in four states, 40% of which was not insured. The amount reimbursed by Proagro was the highest ever, increasing from an average of R\$ 2.2 billion in the two previous years to between R\$ 4.1 and 5.7 billion in the 2021/22 crop³.

To face these and other challenges, the BCB counts on its Agenda BC#, a management instrument also used for communication between the BCB and society. This agenda is organized in five dimensions: 1) inclusion; 2) competitiveness; 3) transparency; 4) education; and 5) sustainability. In this report's edition, there is a specific chapter on the initiatives that make up the sustainability dimension, summarized as follows:

1 <https://www.bcb.gov.br/content/ri/inflationreport/202203/ri202203b9i.pdf>.

2 *Seca causa prejuízo de R\$ 45 bi para o agro em quatro estados* (canalrural.com.br).

3 <https://www.BC.gov.br/content/publicacoes/boletimderop/Boletim%20Derop%20Junho-2022.pdf>.

#Sustainability

Measures	Deadline
REGULATION	
Improvements to the disclosure of information by FIs, based on TCFD recommendations	9/2023
Creation of the Sustainable Credit Bureau	12/2023
SUPERVISION	
RSAC Improvement – The Supervision Practice Guide Update	12/2022
Structuring and expansion of information collection on environmental and social risks	12/2022
Evaluation of the exposure of the SFN to transition risks and sensitivity analysis to the risk of extreme drought	✓
POLICIES	
Estimation of the effects of social-environmental risks on the economy	12/2023
Inclusion of sustainability criteria in the selection of counterparties in the management of foreign reserves and in the selection of investment	✓
Studies for the creation of a sustainable financial liquidity facility	✓
RESEARCH	
Implementation of MoU with the Climate Bonds Initiative (CBI)	12/2023
INTERNAL MEASURES	
Strengthening the culture of sustainability	3/2023
Inventory of GHG emissions of the BCB and reduction and mitigation plans	3/2023
Reducing the environmental impact of the processing of banknotes	12/2023
Inclusion of ES themes in the Museum of Economy	6/2024
Review of BCB's Policy for Socio-Environmental Responsibility (PRSA)	✓

This figure does not include actions already completed in the last Report on Social, Environmental and Climate-related Risks and Opportunities, published in September 2021.

Since the agenda is a dynamic instrument, as some of the initiatives are delivered, new measures are incorporated in it. These are some of the measures that have been concluded since the first report, published in September 2021: 1) the evaluation of the exposure of the SFN to climate risks, including transition risks and the sensitivity analysis of the SFN's credit portfolio to extreme drought; 2) studies for the creation of a sustainable financial liquidity line; 3) the inclusion of sustainability criteria for the selection of counterparties in the management of foreign reserves; and 4) the review of BCB's social-environmental policy, along with the establishment of the Committee for Sustainable Economy of the BCB (Ecos). The improvement of the Social, Environmental and Climate Risk Supervision Process (RSAC) and the structuring and expansion of the collection of information on socio-environmental risks (Social, Environmental and Climate Risk Document – DRSAC) were delivered in December 2022.

Until the end of 2023, we expect the following deliverables: 1) the continuation of the Sustainable Rural Credit Bureau's development and the improvement of control mechanisms using georeferencing tools; 2) the enhancement of information disclosed by FIs, based on the *Task Force on Climate-related Financial Disclosure* (TCFD) recommendations⁴; 3) the estimate of the effects of socio-environmental risks on the economy and the SFN; 4) the reduction of the environmental impact involved in the processing of banknotes; and 5) the strengthening of the sustainability culture by the Committee for Socio-environmental Risk of the BCB (CRSO). In 2024, the deliverable anticipated up to now is the inclusion of socio-environmental themes in the Museum of Economy.

In this report, emphasis is given to aspects related to the management of foreign reserves and to the alignment to the TCFD recommendations. Although there is no internationally accepted standard for the presentation of metrics for the disclosure of financial information related to climate, the objective of the data presented in this report is to contribute to the current discussion.

Most of the data presented in this report refers to the period between September 2021 and August 2022. However, some of the information is relative to the 4th quarter of 2022. The reference period is indicated as the data is presented.

4 Industry-led taskforce created in 2015 by the Financial Stability Board (FSB), with the aim of developing guidelines to allow for the disclosure of clear, comparable, and consistent information on the disclosure of risks and opportunities related to climate change.

1

Introduction

This report presents an integrated view of the BCB initiatives related to the management of social, environmental and climate risks and opportunities between September 2021 and August 2022. In general, these risks are connected to ESG factors as well as factors related to climate change.

In this report, the BCB uses the structure proposed by the World Economic Forum (WEF) and the TCFD, and also takes into account the NGFS guidelines for the presentation of information related to ESG factors.

According to the WEF, this information can be organized in four pillars: 1) governance principles; 2) planet; 3) people; and 4) prosperity. There is a specific chapter on each pillar in this report, and an additional one to present the evolution of the initiatives in the sustainability dimension in the Agenda BC#.

Under governance principles, the reader finds information on the institutional purpose and organizational engagement on sustainability and the risk management associated with this issue.

In the planet chapter, one can find information on the BCB's actions regarding the management of risks to the international reserves resulting from climate change. The chapter also contains a discussion of climate risks to financial stability, with a focus on regulation and supervision. Internal risk management is a necessary tool for the institution to preserve both economic and financial stability, thus avoiding potential losses to society. For the planet chapter, the WEF suggests using TCFD recommendations, which include dividing financial climate risks into four areas: 1) governance; 2) strategy; 3) risk management; and 4) metrics and targets. NGFS also suggests the use of the TCFD approach for reporting.

The chapter titled People presents initiatives on financial citizenship, such as the program Learning Value. The chapter also discusses actions to promote equal opportunities for BCB employees.

The chapter named Prosperity reports on initiatives related to financial inclusion, innovation, and relationship with society.

Given its strategic relevance and the link to other chapters, the report starts off presenting the current stage of the initiatives in the sustainability dimension of the Agenda BC#.

2

Agenda BC# Sustainability

The sustainability dimension in Agenda BC# aims to promote sustainable finance, encouraging the adequate management of social, environmental and climate risks in the economy and in the SFN, and integrating sustainability issues to the BCB's decision-making process. The sustainability dimension was launched in September 2020 and is a dynamic instrument, with the incorporation of new initiatives as earlier measures are finalized. This chapter reports on the progress in the BCB's sustainability agenda, highlighting measures and deadlines as follows.

2.1 Regulation

2.1.1 Regulation on social, environmental and climate-related disclosures, based on TCFD recommendations

With an approach broader than only addressing a climate perspective as recommended by the TCFD, FIs will disclose their social, environmental and climate risks and opportunities. Due to the complexity of climate-related issues, the BCB decided to incorporate the TCFD recommendations in the prudential regulation in two phases:

- Phase 1, completed in September 2021, addresses qualitative aspects related to governance, strategy, and risk management; and
- Phase 2, expected to be concluded in 2023 (initially for 2022), will address quantitative aspects, focusing on metrics and targets.

Considering international initiatives for disclosure, notably the global baseline of sustainability-related disclosure currently under development by the International Sustainability Standards Board (ISSB), a new board of the IFRS Foundation, the postponement of Phase 2 seeks further alignment of the new regulation regarding quantitative aspects with ongoing international initiatives. In this context, it is worth mentioning the holistic approach currently under discussion in the Basel Committee for Banking Supervision (BCBS), with the objective of developing a prudential treatment of climate-related financial risks, including a disclosure standard.

2.1.2 Creation of the Sustainable Rural Credit Bureau and identification of social and environmental benefits in rural credit transactions

Rural credit, governed by Law No. 4.929, of November 5th, 1965, is based on guidelines and instructions issued by the National Monetary Council (CMN), the BCB being responsible for coordinating and supervising compliance with its decisions. Monetary authorities around the world have been adopting measures with the objective of incentivizing the market to increase resources for sustainable finance given the impact of social, environmental and climate risks, which are reflected in credit and operational risk for FIs and, consequently, in the short and long-term stability of financial systems. For this reason, the BCB and the CMN have established, in 2008, social and environmental guidelines for the granting of credit by financial institutions, which includes specific regulation applicable to rural credit.

One of the initiatives in the scope of the sustainability dimension in Agenda BC# is the evolution of the Rural Credit and the Proagro Operations System (Sicor), which will become a Sustainable Rural Credit System, guided by open finance principles. Resolution BCB 204, of 2022, will allow beneficiaries of rural credit to make available information registered in the new system to any interested party without the need of intermediation by financial agents. The same Resolution determines the full disclosure of operations which receive any government subsidy.

Sicor, whose operations are processed in real time, cross-references databases while also consulting external systems, validating records, and certifying the veracity of information, thus preventing the formalization of operations that are not in conformity with the regulations pertaining rural credit. Every year, around two million rural credit operations are registered in Sicor, their contracted amount totalling more than R\$300 billion. When the operations are being registered, information is collected in 270 data fields, which are subject to 1,300 verifications.

Based on consultations with several specialized technical entities dedicated to establishing standards for the issuance of green bonds, and on meetings with experts from various public and private institutions involved with the issue of sustainability in rural credit operations, a set of parameters associated with the sustainability of rural projects will be created. In addition, rural data fields already in place that contain information relative to the social, environmental and climate benefits of the rural enterprise will be highlighted.

By making it easier to identify rural credit operations that have social or environmental benefits, the financial system should offer more favorable conditions to producers with sustainable characteristics, because FIs should more strongly mitigate the risk of granting credit for operations with higher social or environmental risk. In addition, information related to sustainable operations allows its use by green bond certifiers, rating agencies specialized in ESG criteria, and service providers hired to audit the adherence of enterprises to social and environmental requirements.

With the Sustainable Rural Credit Bureau, Sicor will integrate its data with information from government databases, increasing the efficiency in the granting of rural credit, fostering the improvement of risk management by financial institutions, with the consequent increase of efficiency and soundness of the SFN, and also allowing access to new sources of funding, for its integration with open finance principles.

2.2 Supervision

2.2.1 RSAC Improvement – The Supervision Practice Guide (GPS) update

The action aims to strengthen guidance for financial institutions on aspects assessed by the BCB's supervision in relation to the new rules on both risk management and responsibility policy associated with social, environmental and climate-related issues (Resolutions CMN 4,943 and 4,945; Resolution BCB 138). The steps for implementation are: (i) studies; (ii) preparation of a preliminary GPS draft; (iii) evaluation by the departments of the Deputy Governor for Supervision's office (Difis); (iv) revision of the document; (v) reassessment by Difis departments; (vi) draft review; (vii) evaluation by the Deputy Governor of Regulation (Dinor) and by the Attorney General of the Central Bank (PGBC); (viii) final review; and (viii) publication. This action was completed in October 2022.

2.2.2 Structuring and expansion of information collection on environmental and social risks

In order to collect information from FIs regarding the assessment of their social, environmental and climate risk exposures, and of their respective debtors, the BCB instituted the Social, Environmental and Climate Risk Document (DRSAC) through Resolution BCB 151 and Normative Instruction BCB 222, both of 2021. Data will be sent every six months and implementation will be phased, starting with larger and more complex institutions. The first submission is scheduled for February 2023, with data from 2022.

The content of the DRSAC was defined by specialists from the BCB and suggestions from the industry were incorporated throughout the process. The document captures exposure to counterparties whose practices, projects or economic activities present, directly or indirectly, the potential to generate losses for institutions caused by associated events:

- a) the violation of fundamental rights and guarantees or acts harmful to the common interest;
- b) the degradation of the environment, including the excessive use of natural resources;
- c) the process of transitioning to a low carbon economy; and
- d) frequent and severe weather events and long-term environmental changes, which may be related to changes in weather patterns.

The expected result is a broad mapping of social, environmental and climate aspects associated with credit and securities operations recorded in the balance sheet of financial institutions enabling analyses, studies, statistics and evolutionary information, in addition to consistency and comparability.

The DRAC will enable a systematic evaluation of processes and better knowledge of social, environmental and climate responsibility policies and the risk management structure of financial institutions. Additionally, the information obtained should help in the improvement of the social, environmental, and climate risk supervision process, at both the micro and macro-prudential levels, with an emphasis on improvements to the Social, Environmental and Climate Risk Matrix.

2.2.3 Assessment of SFN exposure to transition risks and sensitivity analysis to extreme drought risks

2.2.3.1 Assessment of climate transition risk

In parallel with the implementation of the DRSAC, as part of the constant evolution of social, environmental and climate risk monitoring, the BCB published in section II item 2.1 of the Financial Stability Report (REF) of November 2022, an analysis of the SFN's exposure to climate transition risk in its credit operations.

The evaluation was based on an internally developed methodology with the help of external consultants, based on official public data on GHG emissions and production by segment/industry and the credit information from the Credit Information System (SCR).

2.2.3.2 Sensitivity analysis to extreme drought risks

The BCB developed an exercise to assess the sensitivity of credit portfolios of financial institutions to physical risk, under current and future scenarios of extreme droughts. For such, the BCB used extreme drought projections developed by the National Institute for Space Research (INPE) together with credit data of the financial system from the SCR.

This analysis, together with the assessment of exposure to transition risk mentioned in the previous section, are the first studies resulting from a continuous action by the BCB, associating and adapting different methodologies and databases. The result and the details of the methodology used in both analyses were published in Section II, items 2.1 and 2.2 of the REF (Financial Stability Report) of November 2022.

Given the complexity of the topic, the dynamicity of the emergence of new methodologies and the availability of new databases, we expect to conduct new studies in the future that incorporate new methodologies and address different aspects of climate risk.

2.3 Policies

2.3.1 Inclusion of sustainability criteria for the selection of counterparties in the management of foreign reserves and the selection of investment

Regarding the inclusion of sustainability criteria for the selection of counterparties for foreign reserves investment operations, there is an annual counterparty evaluation process which measures different aspects, such as execution, back-office and

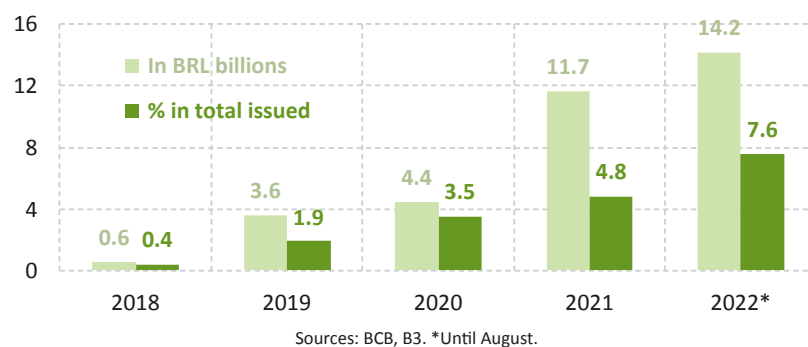
market analysis. This assessment fosters competition and potential rotation among financial institutions eligible to trade with the BCB. As part of this framework, an indicator that ranks sustainability of these counterparties was included, in order to encourage banks to increasingly pay attention to their actions concerning social, environmental and climate risks and opportunities. The regulation that guides this process was approved, and the assessments carried out in 2022 already consider this new criterion.

The importance of sustainability is also present as part of the investments made with foreign reserves. Green bonds have already been an authorized asset class for many years, and the recent inclusion in the benchmark of two portfolios with sustainable bonds denominated in USD and EUR reinforces the strategic nature of the sustainability theme as an additional element to the reserves investment policy, maintaining security, liquidity and return as the main pillars. In addition to bonds, some corporate bond ETFs were also selected taking into account their ESG classification.

2.3.2 Creation of the Sustainable Financial Liquidity Facility

In November 2021, the new financial liquidity facilities of the BCB became operational. Since then, studies to assess the impacts of social, environmental, and climate-related risks in the valuation and haircut models have been conducted. As highlighted by the RIS of September 2021, further advances still depend on the development of credit risk metrics that properly incorporate positive externalities of sustainable features exhibited by corporate debt instruments and on the creation of an official taxonomy for green, social, and sustainable bonds. Despite this, the BCB has already been following the issuance and volume of transactions of corporate debt bonds classified as green, social, and sustainable according to national and international certifying entities⁵ (Figures 1 and 2).⁶ The pool of sustainable assets accepted as collateral by the BCB in the liquidity facilities has also been monitored (Figure 3).

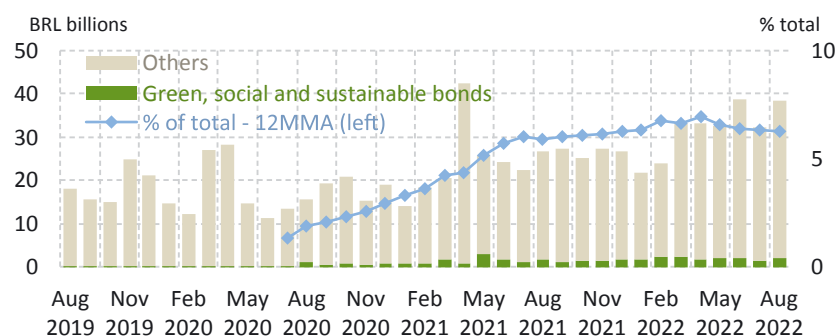
Figure 1 – Issuance of green, social, and sustainable bonds and its percentage on total bonds



5 As Bureau Veritas, Bureau Veritas Brasil, Climate Bonds Initiative, Natural Intelligence, Resultante, S&P Global, Sitawi and Virgeo Eiris.

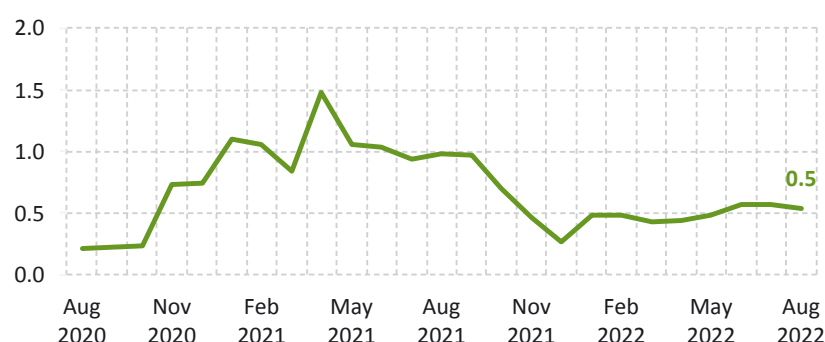
6 The Figures consider only green, social, and sustainable corporate bonds that were issued by Brazilian companies in the domestic market, excluding sustainability linked bonds and bonds issued in the international markets.

Figure 2 – Transactions of green, social, and sustainable bonds and of other conventional bonds in the secondary market



Sources: BCB, B3

Figure 3 – Green, social and sustainable bonds in the BCB collateral – BRL billion



Source: BCB

Resolution BCB 151/2021 also has the potential to support the process of structuring and expanding the data related to social, environmental, and climate risks of the financial assets. Based on this resolution, financial institutions that declare responsibility for these risks, in the context of the PRSAC⁷, are required to submit their credit operations and securities exposures to social, environmental, and climate-related risks from December 2022⁸.

These advances, although yet in an early stage, can help with the process of collecting and creating data, which are essential to foster the discussion about sustainable assets differentiation in the financial liquidity facilities during the next years.

2.3.3. Estimation of the effects of the socio-environmental risks on the economy and the SFN

2.3.3.1 Macroeconomic impacts from climate events and transition policies to low-carbon economy

The project aims to develop structural macroeconomic models to address climate issues, focusing on the generation of macroeconomic scenarios as input for financial stability stress tests. The following steps have been planned:

⁷ PRSAC – Risk management and Social, Environmental and Climate Responsibility Policy.

⁸ Initial date for S1. For the other banks segments, the initial date for the disclosure requirement varies from June 2023 (S2) to June 2024 (S4).

- a. adapting DSGE models for the Brazilian economy to address important aspects related to climate issues, including fossil and renewable energy as alternative inputs for production; effects of acute and chronic climate events on productivity, supply, demand, and prices (i.e., agriculture and hydroelectricity sectors); consumers and investors' decisions concerning fossil assets (green preferences); and government policies for transition to a low-carbon economy (carbon tax and transferences);
- b. building aggregate indicators to better capture specific effects on sectoral, regional, and macroeconomic variables (i.e., productivity, supply, demand, and prices), promoting partnerships with government institutions specialized in climate, such as the Brazilian National Institute of Meteorology (INMET), INPE and the Brazilian Agricultural Research Corporation (Embrapa), to have access to granular climate data;
- c. participating in NGFS activities, considering the use of its scenarios as reference for domestic climate models.

The three stages are under development and continue to advance as expected.

2.3.3.2 Economic and financial effects of the Mariana dam failure disaster

The project aims to measure the economic and financial effects of the 2015 Mariana dam failure disaster, which released toxic mining waste down the Doce River. The project investigates the effects on economic activity, payment flow in the production chain, and local consumption due to water contamination in riverside municipalities. The project is sponsored by the Inter-American Development Bank (IDB), with the hiring of David Kaeser, professor in the Department of Resource Economics at the University of Massachusetts Amherst, as a mentor for criticism and improvements. The project has been divided into the following steps:

- a. dataset preparation;
- b. definition of treatment and control groups;
- c. model adjustments;
- d. analysis of the results;
- e. working paper preparation;
- f. incorporation of adjustments and suggestions;
- g. publication.

Current status

- a. Preliminary results of the project, detailed below, have already been presented in seminars. However, additional exercises are being carried out to refine the analyses according to the recommendations presented by the mentor. After the conclusion of the empirical part, new results will be incorporated into the text before sending it for publication in the Working Paper Series of Banco Central do Brasil.
- b. The value of clean water was assessed based on the disaster's effects and its major environmental and social repercussions.
- c. Negative externalities for the supply chain of companies in the municipalities bordering the Doce River were quantified, based on a difference-in-differences strategy with data from the Brazilian Payments System, including electronic transfers to settle business to business transactions.

- d. BCB's credit registry data have been used to measure households' local consumption. This dataset made it possible to analyze transmission channels through which the dam failure affected the local economy, as well as to quantify how and to what extent water contamination impoverished the affected riverside municipalities.
- e. Negative externalities introduced by water polluters interrupted businesses' supply chains, led to a decline in consumption and destroyed wealth with considerable effects on the GDP of the affected riverside municipalities that are more dependent on agriculture.

2.3.3.3 Effect of frost on the production chain of firms

The project uses empirical models to assess the magnitude and propagation of local shocks resulting from extreme weather events by employing real-time data on payments and loans. The project is being developed in partnership with researchers from MIT and follows the same steps as the previous project, item 2.3.3.2.

Current status

Four frost episodes occurred between June 29, 2021, and August 2, 2021. The severity of the frosts was outside the range of forecasts at the time of planting, as a once-in-50 to once-in-100-year event. We view it as a negative supply shock with spatial variation in exposure due to crop planting patterns, heterogeneous crop sensitivity to temperature extremes, and extremely low temperatures. These shocks will be used to analyze potential economic and financial implications in the inter-firm supply network.

The project is currently in the phase of data collection, compilation, and pre-processing, with the need to adjust the "boletos" (bank payment slips), electronic transfers (TED) and instant payments (Pix) databases at the payment level from the client firm to the supplier firm over time.

2.3.3.4 Estimation of extreme event effects on firms' financial flows

This is a generalization of the frost study described in item 2.3.3.3 with the objective to estimate the effects of extreme climate events on firms' cash flow. The project was organized following the same implementation steps of the projects described in the item 2.3.3.2. It adopts a model similar to that of Custódio, Ferreira, Garcia-Appendini, Lam (2020) "Economic cost of climate change" but uses payment flow data from "boletos" (bank payment slips), electronic transfers and instant payments.

Current status

- a. It is necessary to develop appropriate software to download the climate data available on the INPE website, the Information and Analysis System of the Impacts of Climate Change (Adapta Brasil) of the Ministry of Science and Technology and in the NGFS.
- b. Databases "Adapta Brasil" and NGFS have already been extracted, and the dataset preparation process has started.
- c. Procedures to organize data for use in models are underway.

2.4 Partnerships

2.4.1 Memorandum of Understanding with the Climate Bond Initiative – CBI

CBI is an international non-profit organization that supports and fosters the development of long-term capital markets to accelerate the transition to a low-carbon global economy through green financial instruments. Its work is divided into three fronts: (i) fostering green bond markets internationally; (ii) coordinating the definition of criteria for asset eligibility; and (iii) working on market analysis and intelligence.

BCB and CBI signed a memorandum of understanding, in September 2020, aiming at: (i) promoting the exchange of information on sustainable finance, regulations, mechanisms and initiatives to promote this agenda in the Brazilian Financial System; (ii) facilitating the exchange of information to help the incorporation of international criteria and taxonomies into the systems used by the BCB; (iii) enabling financial institutions to analyze and develop tools for measuring and mitigating climate, social and environmental risks, including the alignment with global initiatives such as the Task Force on Climate-Related Financial Disclosures (TCFD); and (iv) fostering a sustainable finance market, enabling greater attraction of domestic and international investors who demand sustainable investment alternatives in their portfolios.

The achievements resulting from the implementation of this memorandum include: (i) training of BCB employees on topics related to sustainable taxonomy, sustainable certificates and sustainable finance, in courses provided by the CBI; (ii) participation of BCB employees as speakers at international events on sustainability to present the Sustainability Pillar of the Agenda BC#; and (iii) technical meetings with CBI specialists to identify sustainability criteria in rural credit within the scope of the development of the Sustainable Rural Credit Bureau.

2.5 Internal measures

2.5.1 Inclusion of the socio-environmental theme in the Museum of Economy

The sustainability theme is one of the principles that should guide the development of the exhibition of the new museum of economy. Sustainability must be a separate content, or a transversal one, to be presented throughout the exhibition. It must also be a practice of the museum itself and an invitation for its visitors to engage in sustainable practices. Thus, the inclusion of the topic of socio-environmental responsibility represents an opportunity for the Banco Central do Brazil to expand its interaction with society, being yet another element that integrates with the content of the new museum of economy. The measure to create the museum was divided into two stages:

- 1) Validation of the sustainability theme in the museum by BCB's Board
- 2) The inauguration of the Museum with sustainability content

The elaboration of the sustainability content will be carried out under the Decentralized Execution Term (TED) 07/2019, celebrated between the Ministry of Justice and Public Security, through the Fund for the Defense of Diffused Rights (FDD) and the Central Bank of Brazil to develop the first Museum of Economy in South America (“Education” dimension in the Agenda BC#). The project has an expected duration of 3 years. The cost for renovation and new museography of the Museu de Valores is projected to be R\$20.4 million.

2.5.2 Other measures covered in the following chapters

The BCB continues its efforts to strengthen its internal sustainability culture, as described in section 3.2 of this report. In section 4.2, the inventory of GHG emissions in all BCB buildings is highlighted, as are the efforts to reduce the environmental impact of banknote processing.

3

Governance

3.1 Purpose

The mission of the BCB is to guarantee the stability of the currency's purchasing power, to ensure a solid, efficient and competitive financial system, and to promote the economic well-being of society. Socio-environmental responsibility and integrity are among its institutional values, and BCB acts with respect for citizens, the environment, employees and other stakeholders, with a view to sustainable development. The BCB aims to be recognized for the effective fulfillment of its mission, and also for promoting inclusion, transparency, sustainability and competitiveness in the financial system and for encouraging citizens' financial education.



Considering its mission, BCB contributes to sustainable development on the social, environmental and economic fronts. With regard to the risks associated with climate change, the impacts on the SFN and the economy are assessed and monitored.⁹

In its Institutional Strategic Plan (ISP-BCB), the BCB emphasizes the risks associated with ESG factors in its declaration of the vision of the future and in the explanation of the strategic objective “to promote sustainable finance and contribute to the reduction of socio-environmental and climate risks in the economy and in the Financial System”.

Observing the ISP-BCB and the value chain, it is possible to notice the contributions of the BCB to several Sustainable Development Goals (SDGs) established by the United Nations General Assembly in the document “Transforming Our World: the 2030 Agenda for Sustainable Development”.



1 No poverty

1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, (...) and **financial services, including microfinance**.

⁹ These risks are associated with an increase in the temperature of the Planet above 2°C, in this century, compared to the temperatures of the pre-industrial period. With the Paris Agreement, signed by Brazil in 2015, the signatory countries made the commitment that the increase in the temperature of the planet will not exceed 2°C in this century and that efforts will be made to ensure that this increase is less than 1.5 °C.

2 Zero hunger

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, (...) **financial services, markets** (...).

5 Gender equality

5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, **financial services**, inheritance and natural resources, in accordance with national laws.

8 Decent work and Economic growth

8.1 **Sustain per capita economic growth** in accordance with national circumstances and, in particular, at least 7% gross domestic product growth per annum in the least developed countries.

8.3 **Promote development-oriented policies** that support productive activities, decent job creation, entrepreneurship, creativity, and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, **including through access to financial services**.

8.10 **Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all.**

9 Industrialization, innovation and infrastructure

9.1 **Develop** quality, reliable, sustainable and resilient **infrastructure**, (...) to support economic development and human well-being, with a focus on affordable and equitable access for all.

9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to **financial services, including affordable credit**, and their integration into value chains and markets.

10 Reduce inequality

10.c By 2030, reduce to less than 3 per cent the **transaction costs of migrant remittances** and eliminate remittance corridors with costs higher than 5 per cent.

10.5 Improve the **regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations**.

10.6 Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver **more effective, credible, accountable and legitimate institutions**.

12 Sustainable consumption and production

12.6 Encourage companies, especially large and transnational companies, to **adopt sustainable practices and to integrate sustainability information into their reporting cycle**.

16 Peace, justice and effective institutions

16.a **Strengthen relevant national institutions**, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime.

16.b Promote and enforce **non-discriminatory laws and policies for sustainable development**.

16.4 By 2030, significantly reduce illicit **financial** and arms **flows**, strengthen the recovery and return of stolen assets and combat all forms of organized crime.

16.6 Develop **effective, accountable and transparent institutions** at all levels.

17 Partnerships and means of implementation

17.13 Enhance global **macroeconomic stability**, including through policy coordination and policy coherence.

3.2 Structure and engagement

The BCB is managed by its Board of Governors and has an Executive Secretariat, an Attorney General's Office, Department and Administrative Units. The BCB's highest decision-making body is the Board of Governors, made up of the institution's governor and deputy governors. In parallel, there are three committees at the Board of Governors level:

- the Monetary Policy Committee (Copom) ordinarily meets eight times a year to define the basic interest rate target for the economy;
- the Financial Stability Committee (Comef) establishes guidelines for maintaining financial stability and preventing systemic risk;
- the Governance, Risks and Controls Committee (GRC) defines guidelines and strategies related to corporate governance and risk management and internal controls and adopts measures for the systematization of practices in these areas. Among the risks addressed by the Integrated Risk Management Policy of the Central Bank of Brazil (PGR-BCB) are social, environmental and climate risks.

In 2017, the BCB implemented its own Socio-Environmental Responsibility Policy (PRSA) and created the governance structure for its implementation and monitoring: the BCB Organizational Socio-Environmental Responsibility Committee (CRSO). The CRSO is responsible for coordinating our internal socio-environmental actions as well as consolidating our good practices and exchange of experiences, with the aim of improving our sustainable agenda.

In December 2021, as part of the PRSA review, Ecos was created, through BCB Resolution 169, of December 2, 2021. It is an advisory committee, with regular reporting to the GRC, which aims to coordinate the initiatives, projects and activities carried out by the different areas of the BCB in the Sustainability dimension of the Agenda BC#. Ecos also aims to harmonize and disseminate

information on internal and external initiatives to the BCB for all areas of the institution, since the theme is broad and growing, and touches on subjects from different areas.

The BCB participates in several forums and international organizations, with emphasis on its participation in the BCBS, the Financial Stability Board (FSB), the NGFS and the G-20, which have specific groups to discuss climate issues and their possible impacts on the system financial. The BCB also supports the TCFD. Among the members of the Board of Governors, it is incumbent upon the Deputy Governor for International Affairs and Corporate Risk Management to represent the BCB at the NGFS plenary, currently as a member of the Steering Committee, with a mandate from 2022 to 2024, and to promote the coordination of the efforts of the areas of the Central Bank related to sustainable finance and climate risk. In 2020, the BCB announced a set of actions that make up the “sustainability” dimension in the Agenda BC#, comprising internal corporate actions and actions aimed at the SFN. These actions and their development were highlighted in chapter 2 of this Report.

3.3 Integrated risk management

BCB has a robust and well-established corporate risk management structure, with models based on best international practices. By adopting the Enterprise Risk Management approach, risk management seeks to comprehensively assess BCB’s risk exposure, considering not only the different types of risks incurred, but also the interaction between them.

As provided for in the Integrated Risk Management Policy, the information produced within the scope of corporate risk management process, using a specific methodology, supports decision-making and seeks to strengthen the defense of the organization's processes, by identifying, assessing, controlling risks, and mitigating possible losses. Doing so, the process adds value by supporting strategic decisions, and also value protection.

At the strategic level, the use of risk information is highlighted as an input for decision-making by senior management, such as resource allocation and strategic actions development.

Once a decision is made, risk management at operational level enables the implementation of that decision in a controlled manner, after the adoption of additional risk mitigation measures, when necessary. At the tactical level of the organization, the data produced by risk management serve as complementary approaches between decision and defense.

Social, environmental and climate risks are part of BCB’s Risk Management Policy and embedded in the models used for different types of risk, reaching all institutional processes. Therefore, those types of risk can be managed and are considered in the decision-making process.

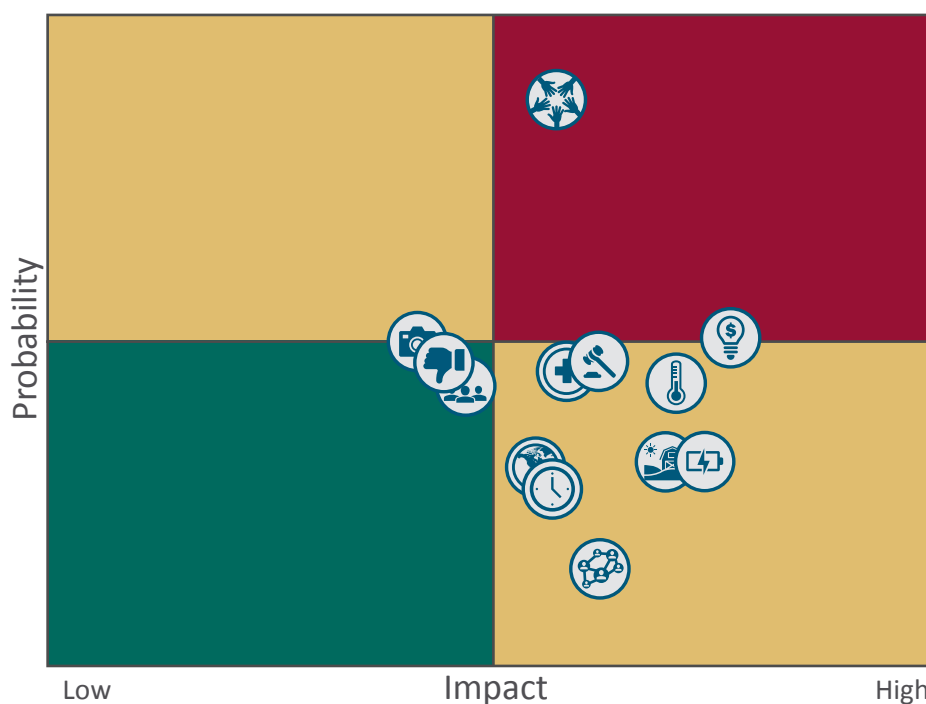
3.3.1 Strategic risks

In order to ensure the achievement of institutional objectives, it is necessary to manage the risks related to BCB's strategy. Consequently, the so-called strategic risks correspond to the measurement of uncertainty related to potential external and internal events that may affect the fulfilment of BCB's institutional mission or its strategic objectives.

In addition to measuring impacts, by analysing the magnitude of the possible effects for the strategic objectives, another element considered is the probability of occurrence of each risk.

The identification and measurement of strategic risks are carried out through consensus perception model,¹⁰ and followed by expert judgment,¹¹ outcomes of which are displayed on the BCB's strategic risk matrix. Finally, the analysis of BCB's strategic risk matrix and the criticality of each risk make it possible to identify top strategic risks and define priority for risk response.

Following it is possible to find the illustration of the 2022 strategic risk matrix referring to the strategic objective "Promote sustainable finances and contribute to the reduction of socio-environmental and climatic risks within the economy and the Financial System" and risks of other strategic objectives related to the topic. The description of the risks come along with the main measures to mitigate them.



¹⁰ Consensus perception model: model developed by BCB and composed of rounds for risk assessment with the participation of BCB experts until consensus is reached on the relevance of risks and their measurements.

¹¹ Expert judgment: validation by the members of GRC of the risks mapped in the consensus perception model, and possible reassessment.

A. Failure to coordinate actions



Risk of failure to coordinate institutional actions in response to social, environmental and climate-related risks for the Brazilian economy. Possible consequences of this risk are uncertainties related to compliance with standards and agreements on climate between countries, which, in turn, may impact the flow of investments to Brazil.

To address this risk, BCB highlighted within the Agenda BC# the “Sustainability” dimension to promote transparency and effectiveness in actions within its scope of action, to facilitate coordination between economic agents, and to mitigate risks of achieving Institution’s mission.

B. Inflation rise due to environmental issues



Risk of rising inflation caused by events related to climate and environmental issues. These events can be caused by physical risks, such as extreme weather events or associated with gradual changes in the climate, like increase prices of food due to crop failures and increase in the cost of energy. Or even events related to transition risks, due to societal changes resulting from a transition to a low carbon economy.

The BCB actions in this area refer to estimating the effects of socio-environmental risks on the economy and the financial system, through the adaptation of macroeconomic models to simulate events of this type and the assessment of the economic-financial effects of socio-environmental risks. An example of occurrence of such a risk can be observed on box 1, after risk D.

C. Climate change



Risks related to climate change, by events with potential to materialize through environmental conditions – more frequent and severe – unfavourable to the economy, and by long-term environmental changes, such as scarcity of resources, sea level rise and regime modification rainwater.

The definition of information disclosure requirements related to risks and opportunities arising from social, environmental and climate issues by financial institutions, and the homogenization of information to be published, acts to mitigate this risk. Furthermore, the development of financial system stress-testing incorporating climate risk scenarios will enable BCB to monitor and identify potential threats to financial stability arising from this risk. See also box 1.

D. Higher cost or restraint in energy supply



Possible change in the rainfall regime may affect the production of electricity in the country, increasing its domestic prices. This risk refers to conjunctural issues of high energy prices associated with supply shocks and can cause negative impacts on the national economy.

The adaptation of macroeconomic models for the simulation of events of this type and the assessment of the economic-financial effects of socio-environmental risks also acts to mitigate the effects of this risk in a way that responses can be designed in advance. An example of occurrence of this risk can be observed on box 1.

Box 1

Increased inflation due to water scarcity, with effects on energy tariffs

The electricity tariff flags contributed with 0.67 p.p. for the 2021 inflation deviation from the target, reflecting the weak rainfall regime, which led to the activation of thermoelectric plants and other energy sources with higher cost. After the yellow flag was in effect between January and April, in May the red flag level 1 was triggered. Between June and August, the red flag level 2 was adopted, already with higher values from July. In September, the water scarcity flag was created and triggered, which caused increases of 49.6% over the previous flag and 5.8% on the electricity tariff compared to the previous month.

Source: Inflation Report (IR), March 2022

The scarcity of rains affected the production of electricity and food, increasing domestic prices

Successive supply shocks hit the Brazilian economy in 2021. The lack of rainfall affected the production of electricity and food, increasing domestic prices.

In summary, the effects of supply shocks on household consumption are quick, significant and greater for less essential items. The dissipation of the electricity price shock that occurred in 2021, given the increase in the level of hydroelectric reservoirs and the expected end of charging the additional tariff arising from the water scarcity flag, may be a positive factor for consumption in 2022. On the other hand, On the other hand, the recent substantial increase in the price of commodities in Reais – especially oil and grains, with increases associated with the conflict in Eastern Europe and climatic conditions in southern South America, including Brazil – may negatively contribute to household consumption by throughout the year.

Source: Inflation Report (IR), March 2022

E. Legal risk



Risk of judicial and extrajudicial litigation involving social, environmental and climate issues, related to: (i) the role of the BCB as monetary authority or as regulator and supervisor of the Financial System, including the extension of its legal mandate; or (ii) the role of regulated entities, when such disputes are of systemic relevance.

This risk is mitigated by proactive action within the scope of Agenda BC#, dimension “Sustainability”, and through monitoring and preventive action with judicial bodies and control bodies, for permanent development of Agenda BC#.

F. Economic deterioration due to health crisis



Risks related to increased incidence of diseases with consequences for the economy.

In response to risks of this nature, BCB expanded the set of policies and regulatory instruments available to foster society’s economic well-being, whenever necessary, such as measures to encourage credit and maintain financial stability.

G. Impact of climate change on the economy



Risks of climate change that could impact Brazilian agricultural production and, consequently, generate a relevant shock to the national economy.

The improvement in the management of social, environmental and climate risks in the financial system and the creation of the Sustainable Rural Credit Bureau are aimed at mitigating this risk and demonstrate BCB's care in relation to this issue. Box 2 shows an example of analysis and impacts related to this risk.

Box 2

Increased agricultural losses due to weather events

The 2021/2022 agricultural year totaled, until Jun2022, the amount of 105,933 reported losses (COPs). Of this total, 21,712 are in the status “under review”, 84,221 of which have already been granted, which will require resources in the order of **R\$4.07 billion in compensation**. In comparison, 59,885 COPs were deferred for the 2020/2021 agricultural year, totaling R\$2.27 billion in indemnities. The main climatic events that caused these losses in the 2021/2022 agricultural year were: drought (79.9%), followed by excessive rain (7.5%), disease or pest (4.9%) and frost (3.2%). In the agricultural year 2020/2021, of this set of COPs, the main products were soy, wheat, beans and corn in the South Region, with drought; also with frost in the case of corn second crop; and different events in the case of wheat, with greater participation of frost.

Source: Derop Bulletin – Rural Credit and Proagro, June 2022

Review of the GDP projection for 2022, with a decrease due to climate impacts on agriculture

The forecast for growth in agriculture and livestock decreased from 5.0% to 2.0% since the last IR, mainly influenced by the worsening of estimates for the summer grain harvest, notably soybeans, due to the lack of rainfall in the states in the south of the country and in the south of Mato Grosso do Sul. The volume of precipitation has not yet normalized in these regions, which is a risk for agricultural production, in particular for the second corn crop, which so far has positive prognoses.

The prognosis of the IBGE [Brazilian Institute of Geography and Statistics] for the 2022 grain harvest available on the cut-off date of the last IR indicated production of 270.7 million tons, which would represent an increase of 6.9% in relation to production of 2021, reflecting, in particular, the expectation of stability in soybean production (0.2%) and a sharp rise in corn production (20.6%). However, in the Systematic Survey of Agricultural Production (LSPA) in February, the IBGE reduced the forecast for the 2022 grain harvest to 261.6 million tons (an increase of 3.3% compared to 2021), mainly reflecting the change in the forecast for the soybean harvest, which went from being stable in relation to the previous year to a drop of 8.8%, due to lack of rain in important producing regions.

Source: Inflation Report (IR), March 2022

H. Image risks



Risks of not achieving BCB's vision of being recognized for promoting sustainability in the Financial System.

The performance of BCB in its corporate actions to achieve its mission, regarding social, environmental and climate-related risks and opportunities, seeking transparency with the disclosure of its BC# Sustainability agenda and the publication of Report on Social, Environmental and Climate Risks and Opportunities, mitigates the image risk. In addition, among other actions, the inclusion of the social and environmental theme in the BCB Money Museum and the role of the Organizational Social and Environmental Responsibility Committee and the Ecos Committee also act as a vehicle for mitigating image risks.

I. Loss of opportunity



Risks that BCB does not act urgently and in a timely manner, thus losing the opportunity to contribute to the orderly transition to a cleaner and more sustainable economy.

To face this risk, BCB highlighted, within the Agenda BC#, the "Sustainability" dimension and in 2021 created the Ecos Committee. Both actions confer strategic status to the subject and aim to promote transparency and effectiveness in actions within its scope of action.

J. Understanding the concepts related to sustainability



Risks linked to misperception or lack of complete understanding of the new concepts that the Agenda BC#, dimension "Sustainability" requires.

The review of BC's Social and Environmental Responsibility Policy, the promotion of a culture of sustainability by the Organizational, Social and Environmental Responsibility Committee and the Ecos and the development of this Report on Social, Environmental and Climate Risks and Opportunities are initiatives to improve the understanding of BCB's internal and external agents on the topic of sustainability.

K. Adherence to international practices



Risk of being seen as a central bank that does not adhere to the recommendations of international organizations on social, environmental, and climate-related risks. The occurrence of this risk may impact investor confidence in the country.

Brazil is committed to implementing the recommendations established by the Financial Stability Board (FSB) and the Basel Committee on the Banking Supervision (BCBS), and actively takes part in working groups focused on debates of possible impacts of climate change on the financial sector.

By signing a formal expression of support for the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and by joining the Network for Greening the Financial System (NGFS), the BCB also publicly establishes its commitment to the best international transparency practices in sustainability.

L. Delay in deliveries



Risks of delays in delivering the outcomes of BCB's sustainability agenda agreed with society.

The publicity of Agenda BC#, dimension "Sustainability", as well as the establishment of goals and deadlines for each announced action, determine BCB commitment to mitigating those risks. The publication of Report on Social, Environmental and Climate Risks and Opportunities presents among its objectives to provide more detailed information on the progress of actions.

M. Internal coordination



Risks linked to BCB's internal procedures to plan, organize, control, and deliver the results of the Agenda BC# , dimension "Sustainability".

The appointment of the Deputy Governor of International Affairs and Corporate Risk Management to coordinate the efforts of BCB units related to green finance and climate risks promotes adequate internal governance of institutional processes. In addition, we highlight the inclusion of social, environmental and climate risks in the institution's Integrated Risk Management Policy and the review of internal Social and Environmental Responsibility Policy.

3.3.2 Operational risks

Among the operational risks, those related to possible environmental impacts on internal work processes stand out in this report:

- improper disposal of banknotes after the sanitation process. In response to this risk, since 2017, the material has been used as an energy input in cement manufacturing, through co-processing. The current goal is the full disposal of waste for co-processing by 2023;
- floods at BCB buildings caused by extreme environmental conditions affecting the maintenance of operations. BCB's business continuity plans consider this scenario to avoid compromising critical internal processes;
- lack of water at BCB facilities affecting the maintenance of operations. BCB's business continuity plans also consider this scenario to avoid compromise of critical internal processes.

4

Planet

This chapter is divided into two sections. The first focuses on alignment with the Task Force on Climate-related Financial Disclosure (TCFD) in the management of international reserves, regulation, and supervision of the financial system. The second section focuses on the administrative aspects of the institution, including the management of water, energy, materials, and waste.

Building consensus on how best to measure the financial risks associated with climate change is an evolving process, and the disclosure of this information on section 4.1 contributes to the effort to reach a common understanding on how to measure it.

4.1 Climate changes and financial impacts

Regarding BCB's initiatives related to the management of risks associated with climate change and its economic and financial impacts, the information presented in this section is divided into four pillars: Governance, Strategy, Risk Management, and Metrics, as recommended by the TCFD and presented in the figure below.



Source: Adaptation from TCFD

4.1.1 Climate change risk governance

International reserves

The Balance Sheet of the BCB is presented in schematic form in the figure below. The federal government securities portfolio (Assets in Local Currency) is composed only of securities issued by the Brazilian National Treasury and will not be analyzed in this edition of the report. On the balance sheet, it can be seen that international reserves represent a significant part of the BCB's assets. These reserves are invested in several assets in the main international financial markets and the climate risk metrics presented below refer to these investments.

(R\$ Billion, Dec 31 2021)

Assets	Liabilities and Equity
Assets in foreign currencies 2,209	Liabilities in foreign currencies 295
Assets in local currency 2,079	Liabilities in local currency 3,312
	Currency in circulation 339
	Equity 342
Total Assets 4,288	Total Liabilities and Equity 4,288

It is the responsibility of the Governance, Risks and Controls Committee of the Central Bank of Brazil (GRC) to establish the strategic objectives and the risk and return profile of the country's international reserves.

With respect to the management of the investments, the governance structure of the reserves is supported by BCB's Integrated Risk Management Policy. The investments are made according to guidelines established by the GRC, which defines the risk profile and expected return through a detailed and replicable reference portfolio, operational limits for deviations from the reference portfolio and criteria for measuring results. Among the strategic allocation criteria, parameters related to environmental and climate risks are gradually being introduced in the decision-making process.

Regulation and supervision of the SFN

The BCB regulates and supervises the SFN. Weather events are followed by changes to the main economic variables in the relevant horizon for monetary policy, in addition to bringing significant risks to the SFN.

Climatic shocks, such as droughts (and resulting fires), floods, and extreme temperatures, put the SFN at risk and can affect relative prices in the economy, which in turn can alter the demand for currency and the value of physical goods

and collateral, in addition to bringing high financial burdens for society as a whole. At the BCB, the Financial Stability Committee and the Monetary Policy Committee assess these risks in their decision-making processes.

The BCB monitors the issuance of sustainable bonds by Brazilian issuers (public and private) in foreign currency directly or through its subsidiaries or international branches (see more details in box 4 of the 2021 Banking Savings Report). The BCB also tracks the total global volume of issues and the trends for this type of debt.

The behavior of Brazilian emissions is in line with global emissions in terms of volume, peaking in 2021, with an amount of US\$12.1 billion, and a decline in 2022, with issuances of US\$2.1 billion through November. The potential growth in emissions cannot be dissociated from the interest rate environment in the foreign market. When monitoring sustainable bond issuances, the BCB also looks at the evolution of fees charged on this type of asset relative to assets not related to sustainable targets or metrics. The analysis also breaks down sustainable emissions by type of debt (green bond, social bond, sustainability-linked bond, etc.), in addition to examining the allocation of resources, targets and penalties in case of non-compliance, as well as other aspects.

The risks associated with climatic events, considered relevant by the BCB, are part of the regulatory framework and supervisory practices in actions coordinated by the regulation and supervision areas.

4.1.2 Strategy

International Reserves

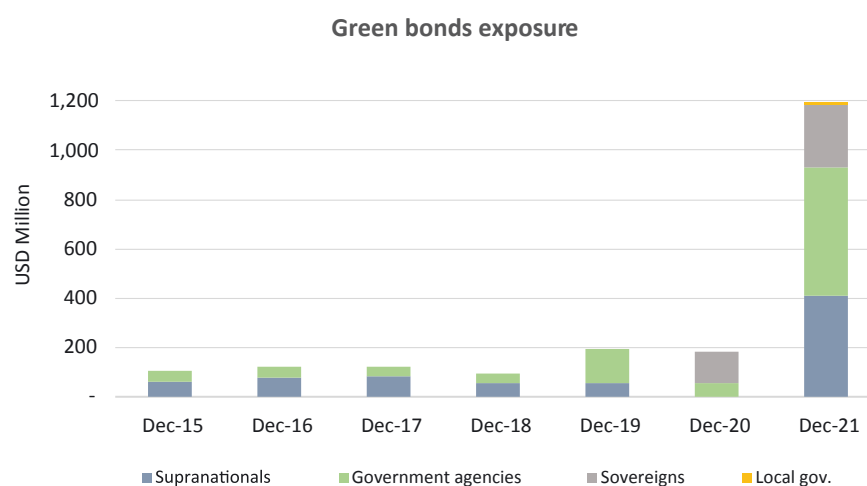
Investments of the International Reserves follow a conservative profile and seek to hedge the country's gross external debt, with the objective of reducing the country's exposure to exchange rate fluctuations, and also embed in its allocation countercyclical characteristics. International reserves are allocated with the support of portfolio risk-return optimization techniques, observing the criteria of safety, liquidity and profitability, prioritized in that order.

There are still no consolidated methodologies and metrics in literature and in the international market as best practices for climate risk assessment to building investment portfolios. On the other hand, an effort is underway for investors and public institutions to monitor and disclose the climate risks of their financial positions based on existing standards, in order to contribute to achieving a consensus on the best form of measurement. Optimization exercises for a strategic allocation of international reserves take into account various asset classes, including those associated with green bonds. In addition, indices of exposure to climate risks of the portfolio are considered in the decision-making process. The BCB, therefore, has gradually introduced operations with bonds with these features in its reserves portfolio, taking into account constraints related to liquidity, profitability and risk, that are also applied to other assets.

As can be seen in the following figure, the BCB has increased the share of green bonds in the reserves investments. Initially, the acquisition of green bonds was made by means of fixed income securities issued by government agencies,

supranationals and central governments in the scope of the active management of the international reserve investments. In 2021, a strategic allocation in green bonds was defined for the benchmark portfolio, considering the risk and return profile of the overall asset classes composition. Figure 7 shows the allocation of reserves in green bonds at year-end since 2015, where the relevant change caused by the strategic allocation can be seen.

Figure 4 – Green bonds in international reserves



Source: BCB, Dec/2021

Regulation and supervision of the SFN

The BCB, aligned with other central banks and with recommendations on the adoption of best practices from international organizations, has developed a series of measures and regulations aimed at socio-environmental issues over the last years. Given the evolution of the theme, which points to structural changes in the economy, the BCB has prepared itself to address the ensuing challenges, incorporating in a more precise way, both in its regulation and in its supervisory practices, the treatment of risks and opportunities related to social, environmental and climatic aspects.

Regulations issued by the BCB (Resolution BCB 139 and Instruction BCB 153, both of September 15, 2021) establish disclosure requirements on social, environmental and climate-related risks, based on the four core elements of the TCFD recommendations: governance; strategy; risk management; and metrics and targets.

Due to the complexity of climate-related issues, the BCB decided to adopt gradually the TCFD recommendations in two phases, as detailed in chapter 2.

In addition to normative actions, the supervision area developed a standard for collecting information from the FIs to help monitoring social, environmental and climate risks: the Social, Environmental and Climate Risks Document (DRSAC). This action was the subject of the publication of Resolution BCB 151 and Normative Instruction BCB 222, both of 2021.

The BCB is working on the evolution of the Rural Credit and Proagro Operations System, which will become a Sustainable Rural Credit Bureau. The Bureau will be

guided by the principles of open finance, which will allow beneficiaries of rural credit to provide information registered in the new system to any interested party. See more details on open finance in section 6.2 of this report. The BCB also works to highlight, in the Bureau, rural credit operations that present social, environmental or climatic benefits.

4.1.3 Risk management

International reserves

The analysis of the risks associated with the investment process is key for understanding financial returns and for adjusting the benchmark portfolio to the investment objectives of the reserves.

The different risks taken in the investment of the international reserves are monitored daily by the BCB. In addition to financial risks, such as market, credit and liquidity risks, the records of eventual operational incidents are also monitored, as well as metrics associated with greenhouse gas emissions that are constructed based on CO₂ equivalent emissions (CO₂e).

The monitoring of CO₂e metrics aims to assess the impact of different investment strategies on the portfolio's carbon profile. The international reserves portfolio is mostly invested in sovereign bonds and, although there is exposure to the U.S. stock market, there is no acquisition of corporate shares. Thus, the monitoring of indices and metrics associated with the portfolio is predominantly influenced by indicators associated with countries rather than companies.

Regulation and supervision of the SFN

The BCB has monitored and evaluated as relevant the positive perception of investors towards sustainable economic and social standards and towards facing the risks associated with climate change. This also applies to the discussions on the subject that are underway between other central banks and financial regulators. This monitoring is an ongoing work and aims at keeping the regulation and supervision of the SFN up to date, given the normative proposals that went through the process of public consultations in 2021.

With regards to social, environmental and climate risks, the exploratory work to verify the current stage of identification and management of such risks by the supervised entities of the larger S1 and S2 segments, or the entities that are relevant internationally, is noteworthy. These efforts consisted of collecting information from FIs on their form of managing social, environmental and climate risks related to credit operations. Additionally, the Socio-Environmental Risk Matrix was improved, through the development of a risk qualification process associated with the sector of activity of the agent with exposure, through the use of relevant public information.

Indicators for monitoring the social, environmental and climate risks associated with the SFN are under construction. The BCB expects to start their use in 2023.

4.1.4 Metrics

International reserves

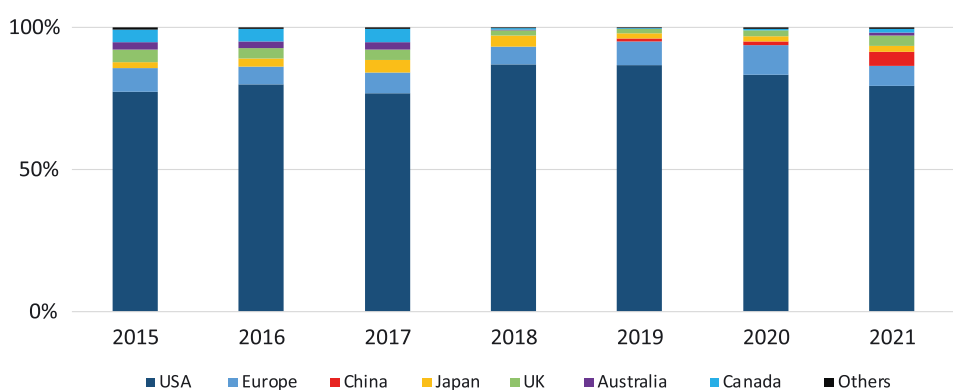
In managing the portfolio of international reserves, the BCB tracks metrics related to climate risks, related to greenhouse gas emissions, energy profile, implicit temperature rise, and investments in green bonds.

Given the absence of a consensus over a single metric for evaluating the investments of the international reserves with respect to climate risk and sustainability issues, and aiming to increase transparency and contribute to the discussion on the topic, this report uses alternative measurements in an exploratory way.

Figure 5 below shows the evolution of the allocation by country in the scope of investment of the international reserves at the end of each year. Throughout the period, the North American dollar is the currency with the largest participation in the investment of the international reserves, primarily due to the strategy of hedging foreign liabilities, in which the North American dollar is the dominant currency in Brazil's gross foreign debt.

The BCB tracks internationally used measures such as the weighted average carbon intensity (WACI). The combination of country allocation with CO₂e emission data normalized by GDP leads to the composition of the metric that is shown in Figure 2 below. It is worth noting that, in this edition of the report, Moody's data was mostly used for the construction and evaluation of sustainability metrics in the scope of reserve investments, and for this reason, the historical data from the previous report were revised. In the previous edition, data from the International Energy Agency (IEA) were employed for the assessment.

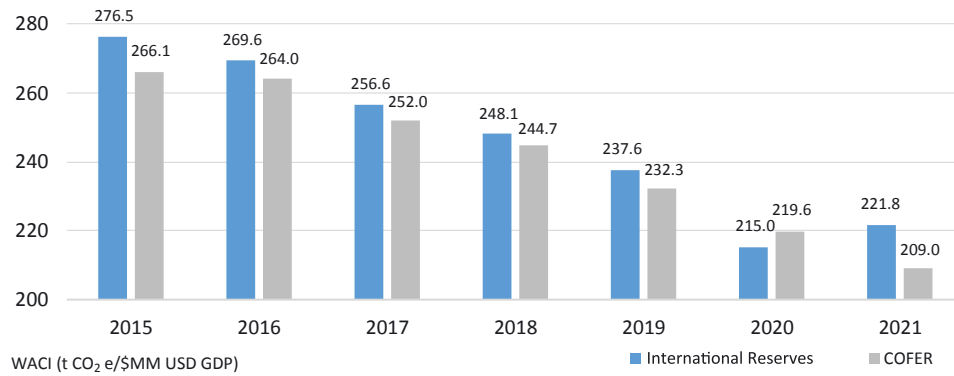
Figure 5 – Country allocation of Brazilian international reserves



Not considered greenbonds, supranationals and Forex, and normalized ex-gold

Source: BCB

Figure 6 – Weighted average of the carbon intensity of international reserves



Source: BCB, with data from IEA – International Energy Agency, Moody's Data Buffet and IMF

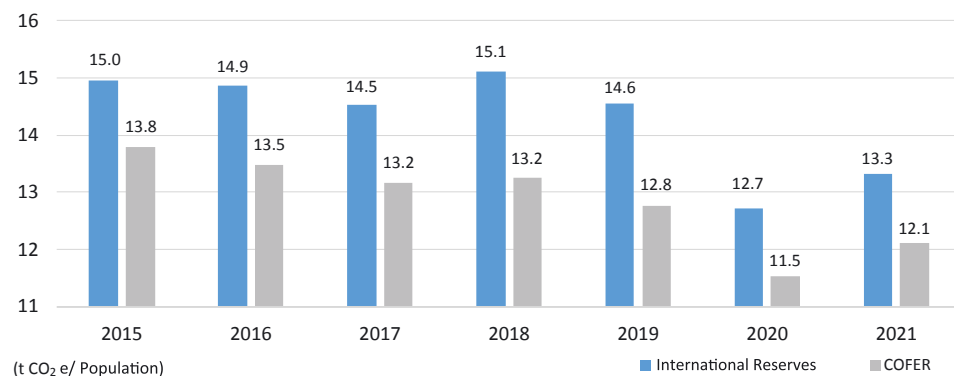
As can be noted on Figure 6, international reserves portfolio's WACI 2021 value was slightly higher than its 2020 figure, due to the increase in allocation of assets denominated in currencies of higher carbon intensity countries (like China, Australia and Canada) and decrease of assets from countries of lower intensity (like those from the Eurozone).

Figure 6 also presents, for comparison purposes, the WACI of a theoretical portfolio of central banks composed of the distribution of currencies of the globally aggregated international reserves, as presented in the IMF website (COFER – Currency Composition of Official Foreign Exchange Reserve). Over the period 2015 to 2021, the downward trend in the WACI value of the analyzed portfolios basically reflects the drop in countries' carbon emissions normalized by GDP.

Another useful metric refers to CO₂e emissions per capita, which allows monitoring the intensity of emissions in relation to the country's population. The current global average per capita emission is 6.5 t CO₂e per person.

Similarly to the WACI metric, Figure 7 presents the weighted average emission figure by combining the allocation across countries with CO₂e emissions data normalized by population, i.e., emissions per capita. As the population of the countries changes incrementally, the increase in emissions in 2021 is explained by the economic recovery, considering that the impacts of COVID-19 on the economy were more intense in 2020.

Figure 7 – Weighted average CO₂ emissions per capita



Source: BCB, with data from IEA – International Energy Agency, Moody's Data Buffet and IMF

One of the main sources of greenhouse gas emissions is power generation. Using data from the International Energy Agency (IEA) on the composition of the energy matrix of countries, it is possible to compose the profile of energy generation associated with the allocation of international reserves in different currencies. This composition allows one to follow how the international reserves are distributed among the various sources of energy generation produced by the countries. The IEA discusses two scenarios for the evolution of the power generation profile and its adherence to the commitment established by the Paris Agreement. This commitment is that the increase in global temperature should not exceed two degrees Celsius this century in relation to the temperatures of the pre-industrial period.

The IEA does not seek to make projections of what will happen, but rather explores different possible scenarios: one scenario reflecting the policy intentions and targets announced to date and another based on full achievement of sustainable energy targets. These are the Stated Policies Scenario (STEPS) and the Sustainable Development Scenario (SDS), respectively.

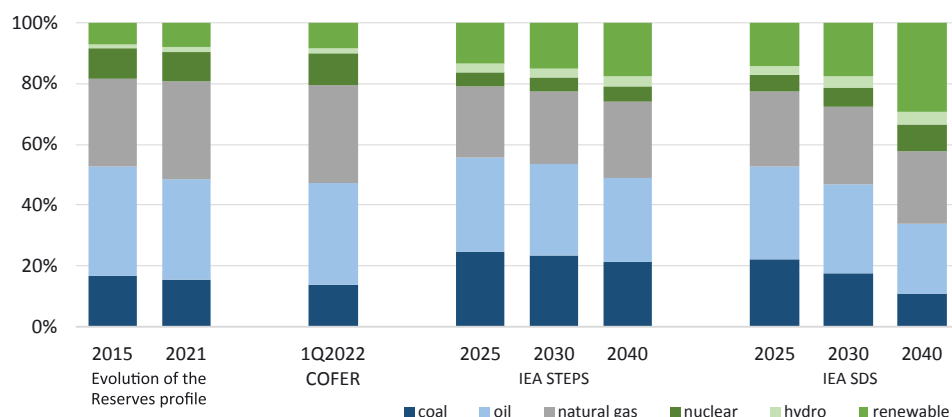
The Stated Policies Scenario (STEPS) reflects not only existing policies but also already announced intentions and plans and their impacts on climate.

The Sustainable Development Scenario (SDS) proposes an evolution of the policy profile aligned with the Paris Agreement goals of “keeping the global average temperature increase below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels”. Achieving this goal requires a level of net-zero emissions (balance of emissions produced with removals by carbon capture and sequestration) in the second half of this century.

Figure 8 illustrates the profile of sources of energy generation weighted by the share of international reserves investments in the countries that make up the allocation. The profile is affected by changes in the allocation of the assets in the portfolios and also by the energy matrix of the countries. The graph also presents the figures for the scenarios STEPS and SDS.

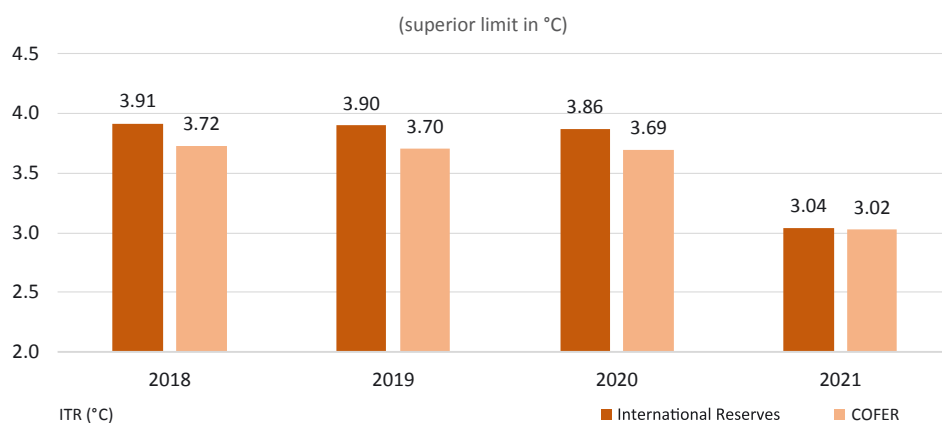
Figure 9 presents the implied temperature rise (ITR) associated with investments of the international reserves. The ITR provides a measure that indicates the alignment of a country, an institution, or an investment portfolio with global climate objectives by comparing, for example, the values calculated for a portfolio to the Paris Agreement temperature rise limits.

Figure 8 – Energy generation profile



Source: BCB, with data from IEA – International Energy Agency

Figure 9 – Implied temperature rise



Source: BCB, with data from Climate Action Tracker

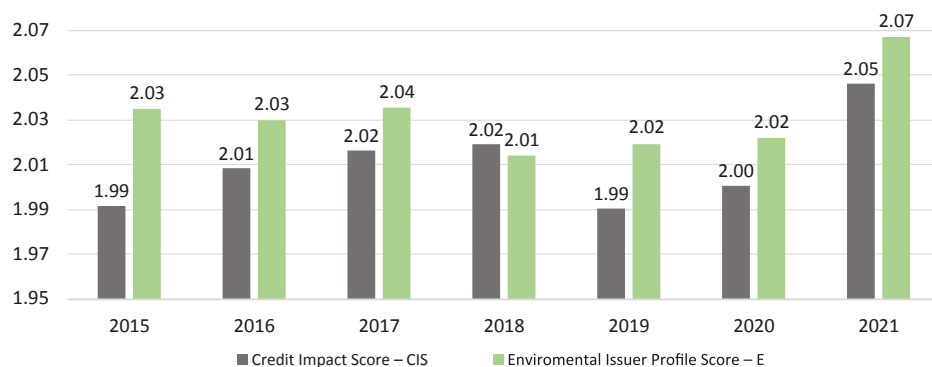
The rating agency and ratings provider, Moody's, offers an indicator that reflects the impact of ESG considerations on the rating of an issuer or transaction. The ESG Credit Impact Score (CIS) is an output of the rating process that relates the impact of ESG considerations to the rating of an issuer or transaction. The CIS is based on a qualitative assessment of the impact of ESG considerations in the context of the issuer's or transaction's other credit factors that are relevant to a given rating.

CIS features a score assessed on an asymmetric five-point scale, where 1 is positive (overall positive influence of ESG attributes on the rating is material), 2 is neutral to low (overall influence of ESG attributes on the rating is non-material), 3 is moderately negative (the overall negative influence of ESG attributes on the rating is more pronounced than the previous), 4 is highly negative (the overall negative influence of ESG attributes on the rating is more pronounced than the previous) and 5 is extremely negative (the overall negative influence of ESG attributes on the rating is more pronounced than the previous).

It is important to clarify that since ratings incorporate all credit factors that are considered relevant in assessing relative credit strength (and the ESG is only one of these factors), there is no direct relationship between a credit rating and a CIS. A high credit rating does not necessarily imply a positive CIS, nor does a low rating imply a negative CIS.

Figure 10 presents the evaluation of the average CIS indicator for the investments of the international reserves. The average of the environmental factor of this indicator (Environmental Issuer Profile Score) is also shown. According to this indicator, the International Reserves Investments are classified as CIS-2 and E-2.

Figure 10 – ESG Moody's Scores (CIS and E)



Source: BCB, with data from Moody's Investors service

Regulation and Supervision of the SFN

The BCB has been working on disclosure requirements of the quantitative aspects of the TCFD recommendations, like metrics and targets. The new regulation is expected to be published in September 2023, as mentioned in section 2 of this report (on the deliverables of the sustainability dimension of Agenda BC#).

4.2 Water, energy and materials

The CRSO is responsible for coordinating BCB's internal socio-environmental actions, as well as for consolidating our good practices and exchange of experiences, aiming to improve our sustainable agenda.

One of the CRSO's most tangible result is the Management Plan on Sustainable Logistics (PGLS), which contains the main goals of the BCB regarding the incorporation of sustainability principles into our business operations. Our PGLS seeks particularly to rationalize the use of natural resources and energy. It is worth mentioning that in 2018 the BCB joined the Environmental Agenda for Public Administration (A3P), headed by the Ministry of Environment.

Regarding the sustainability principles applied to its buildings, the BCB is involved in several initiatives, ranging from composting to the use of waste banknotes as fuel for cement kilns. It is also worth mentioning the hiring of a company to do the Real's life cycle assessment.

Furthermore, in 2022, the BCB started to prepare its Greenhouse Gas Emissions Inventory, in accordance with the GHG Protocol methodology. Once we have our GHG emissions calculated, we will elaborate specific reduction plans for each of our buildings.

In the last ten years, the BCB has withdrawn more than 15,000 tons of worn and damaged banknotes from circulation, considering all of our ten buildings. We guaranteed the correct destination for this waste in all of them.

Regarding the integration of the dimensions E and S of the ESG Agenda, the BCB donates its recyclable materials to cooperatives of collectors. Computers and electronic devices are donated to other institutions in accordance with a Ministry of Science and Technology policy.

Between 2010 and 2022, there was a reduction of approximately 75% of our paper consumption. We achieved this result through our more rational use of paper as well as the implementation of our electronic process. In addition, the BCB has taken measures to increase our energy efficiency and reduce our water consumption by refurbishing our buildings.

Among the actions taken by the BCB until 2022 to encourage the reduction of natural resource consumption, the following stand out:

- installation of selective collection garbage cans in all BCB buildings, replacing individualized garbage cans with shared ones;
- implementation of the second phase of a national campaign for selective waste collection in all our buildings;
- the donation of the total amount of our recyclable material to waste collection cooperatives, in accordance with Decree No. 5.940/2006;
- the destination of the total amount of recyclable paper to recycling cooperatives;
- the donation of electronic devices and furniture to other institutions or NGOs;
- the elaboration of the BCB's Greenhouse Gas Emissions Inventory in accordance with the GHG Protocol methodology, the IPCC 2019 (The Intergovernmental Panel on Climate Change – Guidelines for National Greenhouse Gas Inventories 2019) and the NBR 14.064;
- holding meetings with members of the SFN and peers in order to present the sustainability practices that have been developed within the BCB, serving as a benchmark for them;
- annually, around 70,000 documents are filed with the BCB. The replacement of our on-site protocol by an online protocol system, giving more agility to Brazilian citizens as well as a drastic reduction of paper consumption;
- participation in all six editions of the event "Café com PLS" to exchange experiences and share best practices regarding the implementation of the Sustainable Logistics Management Plan (PLS) in the public sector. The BCB organized the sixth edition that took place in November 2022;
- participation of CRSO members in a specific NGFS working group focused on greening the central bank operations.

5

People

This chapter is dedicated to the opportunities identified by the BCB to promote the respect for the protection of human rights, including fundamental rights and guarantees. The advancement of financial education and citizenship contributes to the fulfillment of BCB's mission in that it promotes conscious consumption, savings and the reduction in loan delinquency rates. In addition, the BCB takes into careful consideration topics such as diversity, dignity, equality, health and well-being, while providing services to Brazilian society. The institution also values its employees and third-party workers as its most prized assets.

5.1 Education

Some important education measures for sustainability are shared with the strategic pillar BC# "Education", detailed as follows.

Launching of the Brazilian Financial Health Index

The Brazilian Federation of Banks (Febraban) in collaboration with the BCB, developed the Brazilian Financial Health Index (I-SFB/Febraban), launched in July 2021. This is the largest assessment on the subject carried out in Brazil, with more than five thousand people surveyed.

The Index is a free diagnostic tool that permits Brazilians to measure their financial health over time and to compare it with the Brazilian average. It is calculated on a scale from 0 to 100 points, with 57 being the average for Brazilians. Based on the score, the tool indicates the financial level, classifying it in one of seven levels: "excellent", "very good", "good", "ok", "low", "very low" and "poor".

In addition to the self-diagnosis by citizens to help them make decisions, the Index is an essential tool for developing public policies on financial education and inclusion, and for the design and offering of financial products better suited to the needs of citizens.

"Aprender Valor (Learning Value)" Program

The objective of the "Aprender Valor" Program is to support education departments and schools in the implementation of financial and consumer education in public elementary schools. Following the precepts of the "*Base Nacional Comum Curricular*", Brazil's common core curriculum, the "Aprender Valor" program was

designed to transversally integrate financial education with mandatory subjects, especially mathematics, portuguese and geography. Up to now, there have been more than 100 thousand educators involved in the program and more than 1.2 million students have been registered in the platform. The program has reached 17 thousand schools in 2,300 municipalities. In 2022, an evaluation of the impact was carried out, and the results will be disclosed in 2023.

The *Aprender Valor* program is funded by the Fund for the Defense of Diffuse Rights (FDD, from the Portuguese *Fundo de Defesa de Direitos Difusos*), from the Ministry of Justice and Public Safety (MJSP).

Launch of the Fourth Version of the Financial Information Booklet for Migrants and Refugees

In November 2021, the fourth edition of the Financial Information Booklet for Migrants and Refugees was launched, in collaboration with MJSP, the UN Refugee Agency (UNHCR) and the International Organization for Migration (IOM). The objective of the booklet is to help migrants and refugees have access to information on financial products and services and to expand the financial inclusion of this vulnerable part of the population.

The main changes relative to the third version of the booklet were the updates to the information on Pix and improvement of the language, that took into account the feedback from training courses for mentors in financial education with participants from the MJSP and from civil society entities appointed by the Ministry, UNHCR and IOM. The booklet is available in Portuguese, English, Spans French and Arabic on BCB's website.

Other Financial Education Actions

Other financial education actions that occurred in the period are detailed in Annual Report and include: a) "*Meu Bolso em Dia*" Financial Education Program; b) The National Financial Education Week; c) Publication of the Second Financial Citizenship Report; d) Delivery of the Financial Education Platform; and e) Launch on Google Arts & Culture.

In the next section, sustainability education actions not in the "Education" dimension of the Agenda BC# are addressed.

Capacity Building of Staff by TCFD

Internally, in order to expand the organization's capacity in Sustainability, BCB employees took the TCFD Capacity Building course in 2021. The course was developed for BCB and offered by SOAS University of London, with support from the German Society for International Cooperation (GIZ).

In addition, in the second half of 2022, the Brazilian National School of Public Administration (ENAP) offered a course on the development of specific indicators for the evaluation of the BC's Sustainable Logistics Plan. The knowledge acquired is helping in the evaluation of the current plan and the elaboration of the next one.

Community of Practice in Sustainability

Internally, we highlight the strengthening of the informal community for exchanging experiences and good practices on the topic of sustainability. The community was created in 2021 with the aim of bringing together people involved with the subject and who work in different areas of the BCB, providing an informal learning environment, dissemination of related knowledge and transversal cooperation in the organization.

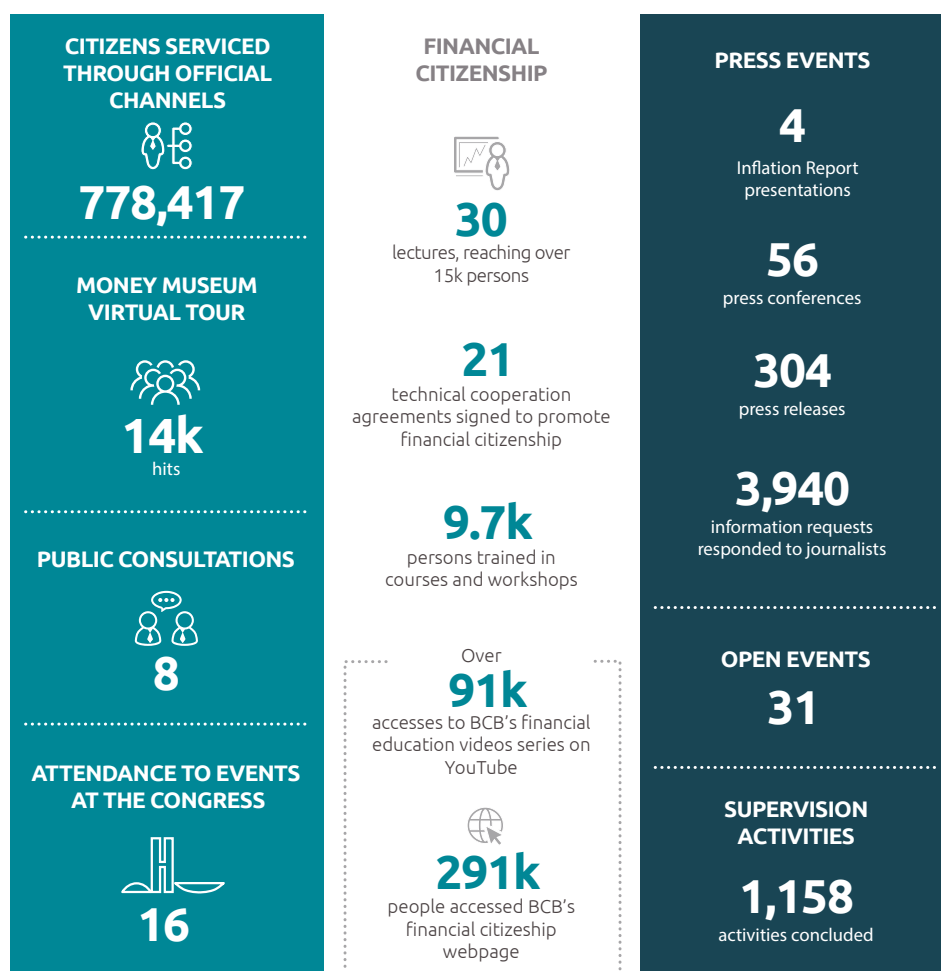
5.2 Financial citizenship

The BCB strives to promote financial citizenship, that is, the exercise of rights and duties that allows citizens the possibility to adequately manage their resources. Financial citizenship can be developed by fostering an environment of inclusion, financial education, financial consumer protection and participation in an ample dialogue on the financial system. In this Report, the education actions were presented in section 5.1 and the inclusion actions, below. In section 6.1, the actions in the “Prosperity” dimension will be presented.

In terms access to the BCB website, 281 thousand people accessed the content on the financial citizenship page; there were more than 91 thousand accesses to videos, 15 thousand people were reached via presentations; 9.7 thousand people participated in courses and workshops and 21 technical cooperation agreements for the promotion of financial citizenship were signed.

5.3 Relationship with society

The BCB maintains a relationship with society through its actions to promote financial citizenship, through the regulation and supervision of the SFN, and through its relationship with the press, public authorities, investors, and rating agencies. In addition, the BCB collaborates with public authorities and civil society, participates in forums and multilateral organizations, and carries out technical cooperation with national and foreign entities. The BCB also seeks to exchange knowledge with academia and market participants, among others. In sum, BCB’s communication channels, as well as its governance framework have strengthened its interactions through transparency and credibility.



5.4 Dignity and equality of treatment

BCB ensures equality of opportunity and treatment. The composition of staff, however, is different in proportion between men and women, in the ethnic composition, and in the quantity of people with disabilities than that of the Brazilian population. Since admission to the BCB takes place through competitive public service examinations, the institution cannot balance directly the staff in terms of gender. However, for people with disabilities and blacks, the BCB follows the national legislation to reserve positions in its selection processes, from 5% to 20% for the first group and at least 20% for the second. With these recruitment actions, the tendency is for diversity to increase with each admission process.

In advisor and manager positions, there is evidence of partial equity: 19% of the workforce declares itself having an ethnic origin other than white; and, among the group of employees who hold the position of advisor or manager, 19% also declare themselves to be non-white. The proportion of managers and advisors who have disabilities (2.6%) is similar to the proportion of BCB's total workforce with disabilities (2.7%). With respect to gender, 23% of BCB employees are women, and they hold 19% of advisor and manager positions.

With the aim of using diversity as a driving force for results in the organization, the Master Plan for People Management, released in April 2021, provides for the development of the Diversity and Inclusion Promotion Program, having structured actions to promote equality.

6

Prosperity

Prosperity is closely linked to the theme of sustainability because it reflects the ability of human beings have a life marked by continuous development and progress in the light of social, economic and technological evolution. All of this in harmony with the environment, in order to generate development and, at the same time, preserve the resources for future generations.

The BCB understands that financial inclusion, the development of innovations and an increase of competitiveness represent opportunities that contribute to the achievement of its mission given that they facilitate access to the financial markets, favoring the soundness of the SFN and the promotion of the economic well-being of society. Furthermore, the strengthening of the relationship with society enhances the Institution's credibility.

6.1 Inclusion

In the "Inclusion" dimension of the Agenda BC#, the actions and initiatives are aimed at facilitating access to the financial market for all: small and large users, investors and borrowers, Brazilians and foreigners. Having inclusion in the financial system as a premise, the topics of micro-credit, corporatism, convertibility, and capital markets are developed.

Increase of cooperative credit

Cooperative credit unions are non-profit organizations which seek to provide financial services to its members through their mutual structure. The characteristics of these institutions include a collaborative philosophy and a pursuit of self-sufficiency. Credit unions need to balance operational efficiency with their members' interests. The increase in cooperative credit is a result of many incentives for its development and insertion throughout the country. Cooperative members increased from 8.4 million in December of 2016 to 14.5 million in June 2022. In this same period, the number of branches, which include headquarters and service units, went up from 5,786 to 8,481. The growth in credit unions is incentivized given the importance of the sector, its ability to be present in even the remote areas of Brazil and its contribution to development in these regions. There is more detailed information on cooperatives in the *Panorama do Sistema de Crédito Cooperativo* – (Panorama of the National System for Cooperative Credit SNCC).

Other action for inclusion

Other actions for inclusion that occurred between August 2021 and August 2022 include a new legal framework for the Brazilian foreign exchange market, that along with other benefits, encourages a greater connection of Brazilian companies – including small and medium-sized ones – to global value chains. The new law will allow individuals to trade foreign currency (up to USD 500) between themselves in an occasional and non-professional manner; b) improvement in the foreign exchange and international capital regulation to increase competition, financial inclusion and innovation in the sector; c) a more comprehensive Banking Report (REB), addressing topics such as portability, household indebtedness, banking competition, regulatory impact analysis and Pix; d) improvement of the regulation of banking correspondents, creating quality and management requirements for electronic platforms; expanding the possibility of contracting derivatives, the benefits of which should include the increase of protections instruments, including for foreign investment in Brazil and for long-term funding, in projects such as infrastructure, which are of the utmost importance for a sustainable agenda.

6.2 Innovation and competitiveness

Consolidation and growth of Pix

Pix is the means of payment created by BCB, in a participatory process with the industry and the civil society, in which funds are transferred between accounts instantly, any time or day. Launched in November 2020, it was built to democratize the access to electronic means of payment, promote financial inclusion, leverage market competitiveness and efficiency, lower costs, and encourage the electronization of retail payments.

By September 2022, about 128 million Brazilians had already made or received at least one Pix. This represents 75.1% of the population over 14 in Brazil. Considering data only through December 2021, 50 million people who had not made a TED¹² between November 2019 and October 2020, made at least one Pix after its launch. This suggests a very strong effect of Pix on the inclusion of Brazilians in the electronic retail payments market, especially lower income and younger age groups, acting as a gateway to the SFN. There was an even greater increase in access to credit for the group of individuals who started using Pix compared with the group that had already used TED.

12 TED is another interbank electronic credit transfer in Brazil that was launched in 2002.



As of December 2021

Regarding companies, about 11 million have already made or received at least one Pix by September 2022. This number represents 76.7% of the companies with some relationship in the SFN. Throughout 2022, we are seeing an increase in the possibility of use of Pix in retail, especially in e-commerce. The low cost of acceptance, the ease and speed with which funds can be made available, and the security of Pix are accelerating digitalization and increasing the efficiency of Brazilian entrepreneurs, contributing to their prosperity.

Open Finance

Open Finance represents the possibility for customers of financial products and services to allow the sharing of their information between different institutions licensed by the Banco Central do Brasil and the operation of their accounts from different platforms, not only from their institution's app or website, in a safe, swift, and convenient way. The Joint Resolution 1, of May 4th, 2020, provides for the implementation of Open Finance.

The objective is to increase the efficiency, competition and transparency in the financial system. The model is based on the premise that the financial consumer is the owner of his/her personal data, according to the provisions of the General Data Protection Law (LGPD), and that it is up to him/her to choose what to do

with the data, in search for better and more accessible services. Open Finance aims at improving financial inclusion through the increase in competition, the reduction of information asymmetries and the development of an innovation friendly environment. This scenario of greater competition, diversification and customization tends to make services more accessible, to increase the convenience for clients and to make them more tailored to the profile, needs and objectives of each individual.

The implementation of Open Finance in Brazil has been a rich and challenging process because regulator and industry are working together to build the foundations of an ecosystem with the potential to change, in the medium and long terms, the paradigms of the market as we know today. On top of these foundations, institutions are beginning to devise products and services focused on the consumer taking a leading role of his/her financial management, deciding what to do with his/her data and enabling the offer of products and services more tailored to his/her needs. However, it is important to note that there are still a lot to be done and use cases are only beginning to be developed.

Since February 2021, public data is available on products and services and the service channels shared by Open Finance's participating institutions. Moreover, the customers can already share their registry information and transactional data related to banking products and services, as well as carry out transactions through the service of payment initiation. Finally, the Open Finance's Governance Structure, under constant monitoring by the BCB, is already implementing the sharing of data on products and services related to foreign exchange, acquiring services in payment schemes, investments, insurance and open pension funds.

LIFT 2021

The Financial and Technology Innovation Laboratory (LIFT) develops prototypes of innovative products. All the projects are proposed by society, making LIFT an open environment with direct participation of people and institutions in the promotion of innovations in the SFN. The LIFT Lab was launched on May 9, 2018 and in its first three editions, 73 proposals for the development of projects were selected. This result in 59 innovative prototypes for the SFN.

In the 4th edition of LIFT Lab, in 2021, BCB selected eleven projects, highlighting for the purposes of this Report, the Amazon Observatory and, in the last edition, the Digital Forest Asset.

The Project Amazon Observatory developed a platform to monitor geographic data in the Legal Amazon through the integration of legal, economic, and environmental information on rural properties. The objective is to help institutions in the granting of credit with a focus on the allocation of resources to develop a modern, dynamic and sustainable economy. The platform that was developed cross-references several databases to obtain information on the rural properties, such as: the overlapping with other properties; relevant information on deforested land; environmental infractions; information on land use; overlapping with lands of Federal Government interest and data on area in hectares and in "fiscal modules", which will allow the definition of productive organization modalities, among other information.

The project Digital Forest Asset was developed in the 2020 LIFT Lab program, its aim was to design, implement and execute forest bond (for preservation or cultivated areas). The bonds will be verifiable and automated by data that permits the creation of a new market and environmental services. This will guarantee the preservation of natural resources, improvements in the agribusiness environment and an increase in production. The infrastructure developed to test the presumption allowed the verification of the viability and existing demand by many businesses that showed interest as potential users.

LIFT is coordinated by the BCB together with the National Federation of Central Bank Employees' Association (Fenasbac). More information can be obtained in the 2021 Annual Report.

Regulatory Sandbox

The Regulatory Sandbox is an environment in which entities are authorized by the BCB to test, for a determined period, an innovative project in the financial or payment area, observing a specific set of regulatory provisions that support the controlled and delimited performance of activities. Its main objectives are to stimulate innovation, the diversity of business models, competition between suppliers of financial products and services and meet the diverse needs of users, within the scope of the SFN and SPB.

The first Cycle of the Regulatory Sandbox began in December 2021, governed by Resolution BCB 50, of 2020, and the following topics were prioritized: solutions for the foreign exchange market; fostering the capital market through synergy mechanisms with the credit market; credit promotion for micro-entrepreneurs and small companies; solutions for Open Banking; solutions for Pix; solutions for the rural credit markets; solutions to increase competition in the SFN and SPB; and financial solutions and payment with potential effects of stimulating financial inclusion and fostering sustainable finance.

The Regulatory Sandbox differs from LIFT, highlighted in the previous item, particularly in its purpose: while the former seeks to validate innovative projects that have already matured through their effective implementation in a controlled environment, the latter follows the development of projects in maturation. In the Regulatory Sandbox, it is possible for participants, exclusively legal entities, to provide products and services to real customers. In LIFT, in which projects can also be presented by individuals, this cannot happen, as the projects take place in a laboratory environment.

To learn more about the topic, access the page dedicated to the Regulatory Sandbox on the BCB website.

CBDC – The Digital Real

The Central Bank of Brazil (BC) has been following the topic of Central Bank Digital Currencies (CBDC) and carried out assessments on the potential issuance of a Digital Real by the institution. The preliminary results were presented to the Board of Governors, which determined the establishment of a regular forum to discuss the topic. There have already been several developments:

- A. publication of the Digital Real Guidelines. Among the guidelines, of note is the incorporation of smart contracts into the financial system and the ability to carry out offline payments, which have the potential to promote financial inclusion;
- B. a webinar series to discuss with society potential topics related to the Digital Real, including the adoption of technologies for financial inclusion, reduction of transactional costs and the improvement of cross-border payments;
- C. a Digital Real Special Edition of LIFT to evaluate CBDC use cases and their technological feasibility. Among the selected projects, we highlight for the purposes of this report, a rural financing solution based on programmable money and a project focused on financing small and medium-sized companies based on decentralized finance.

The Digital Real model to be proposed, if implemented, will allow the BCB to follow the dynamism of the technological evolution of the Brazilian economy; promote the efficiency of the retail payment system; promote new business models and innovations; and favor the integration of Brazil regionally and globally through an increase in the efficiency of cross-border transactions.



BANCO CENTRAL DO BRASIL