Climate Change Adaptation Plan 2021

Risk and Opportunity Assessment

CEMIG

June, 2021

Contents

1. Introduction

Companhia Energética de Minas Gerais (Cemig), Energy Company of Minas Gerais, operates in the areas of generation, transmission, trade and distribution of electric energy, energy solutions (Cemig SIM) and distribution of natural gas (Gasmig). The Group is made up of the holding company *Companhia Energética de Minas Gerais* (Cemig), the wholly owned subsidiaries Cemig *Geração e Transmissão* (Generation & Distribution) S.A. (Cemig GT) and Cemig *Distribuição* (Distribution) S.A. (Cemig D), totaling 185 companies, 14 consortiums and two private equity funds (FIPs), resulting in assets present in 25 Brazilian states and the Federal District. Since its foundation, the organization has assumed the role of bringing collective welfare to the regions where it operates, in an innovative and sustainable way. This determination has led it to be the largest energy distributor in terms of extension of lines and networks, and to be one of the largest energy generation and transmission organizations in the country.

The Company has 89 plants, of which 82 are hydroelectric plants (40 HPPs- Hydroelectric Power Plants, 32 SHPs - Small Hydroelectric Plants and 10 HGPs - Hydroelectric Generating Plants), one photovoltaic plant and 6 wind complexes. The installed capacity totaled 6,086 MW, which represented an increase of 1.1% compared to the Company's installed capacity at the end of 2019. In the national power generation segment, Cemig GT is one of the largest power generators in Brazil, with the installed capacity of 2,303 MW. Currently 100% of the Company's installed capacity is renewable.

Due to the area in which it operates, climate change is listed as one of the main risks and opportunities that can affect its business, so it built its climate strategy that aims to promote mitigation practices and adaptation to climate risks. Throughout 2020, the company reviewed the socio-environmental assessment of suppliers and included greenhouse gas emissions indicators for supplier evaluation, and in 2021 a booklet was available that aims to make its suppliers aware of the importance of identifying climate risks. This initiative is in its initial phase, and other projects and partnerships to foster the low-carbon transition are being studied by the company.

In this document, we are presenting some actions recommended by the Task Force on Climate-related Financial Disclosures (TCFD) on the process of disclosure of the potential effects of climate change, using scenario analysis to identify the potential implications on the company's business and operations. Through this methodology it was possible to identify the physical and transition risks, their impacts, proposing mitigation and adaptation measures.

Throughout 2021, Cemig will continue implementing the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and mapping the main climate risks with the categorization of physical and transition risks.

2. Governance

Cemig's management consists of the Board of Directors and the Executive Board. The members of the Board of Directors, elected by the General Meeting of Shareholders, elect its Chief Executive Officer, Deputy Chief Executive Officer and appoint the Executive Board.

In January 2021, Cemig's Board of Directors approved the revision of the Company's strategic planning for the 2021-2030 cycle. In analyses undertaken on the external environment, five major transformational trends in the electricity sector were identified, which will impact the Company's strategies, requiring greater efficiency, greater customer focus and increased competitiveness. We highlight two of the trends related to climate change: energy transition and new business models.

Within the Strategic Planning, the following initiatives are fully aligned with the effort of mitigating the impacts of climate change:

- Add ~1GW of installed capacity (~450 MWm), with an investment of R$4.5 Bi, focusing on renewable sources
- Bring Cemig's total losses within regulatory limits, mainly by regularizing clandestine connections.

The person at the highest level of direct responsibility for climate change at Cemig is the Deputy Director of Corporate Communication and Sustainability, who reports directly to Cemig's CEO, the CEO being the highest level of the Executive Board, which in turn reports directly to the Board of Directors. The functional attributions of the Deputy Director of Corporate Communication and Sustainability, defined and approved by the Board of Directors, are the approval of technical standards and normative instructions necessary for the development of corporate sustainability, climate change, and social responsibility, aligned with the strategic drivers and sectorial regulation.

3. Risk Management

Based on the guidelines established in the Risk Management Policy, Cemig has structured a program for risk management, which allows for the mapping and evaluation of both strategic risks and those arising from operational processes. This program is coordinated by the Risk Management and Internal Controls

Department, which provides technical support to the different areas of the company. The objective is to provide information to Senior Management for decision making regarding the most relevant risks and opportunities.

Initially, the Company classifies the identified risks as **(i)** process risks, which are those related to operations, limited to the activities of each process; **(ii)** macroprocess risks, whose impacts encompass different processes and Company management; and **(iii)** Top Risks, which are macroprocess risks that can directly impact the Company's strategy.

Based on the risk management program, in 2020 Cemig identified the Emerging Top Risk: Inefficiency in measures to minimize and adapt to the impacts of climate change at Cemig, which is reviewed annually, and its control measures have quarterly monitoring frequency. In addition, we have the Sustainability Plan (2019-2023), which includes actions to address climate change and the Strategic Planning (2020-2024) with approved investments in expansion of renewable energy generation, modernization of distribution networks and smart grids, investments in distributed generation and energy efficiency, all aligned with the low-carbon energy transition.

4. The Climate Strategy

The low carbon economy is a central issue for sustainable development, given the potential impacts resulting from global warming and climate change. Therefore, Cemig has intensified the search for solutions for adaptation and mitigation, avoiding risks and impacts to its business. Cemig reinforces its commitment to **SDG 13 -** Action Against Global Climate Change.

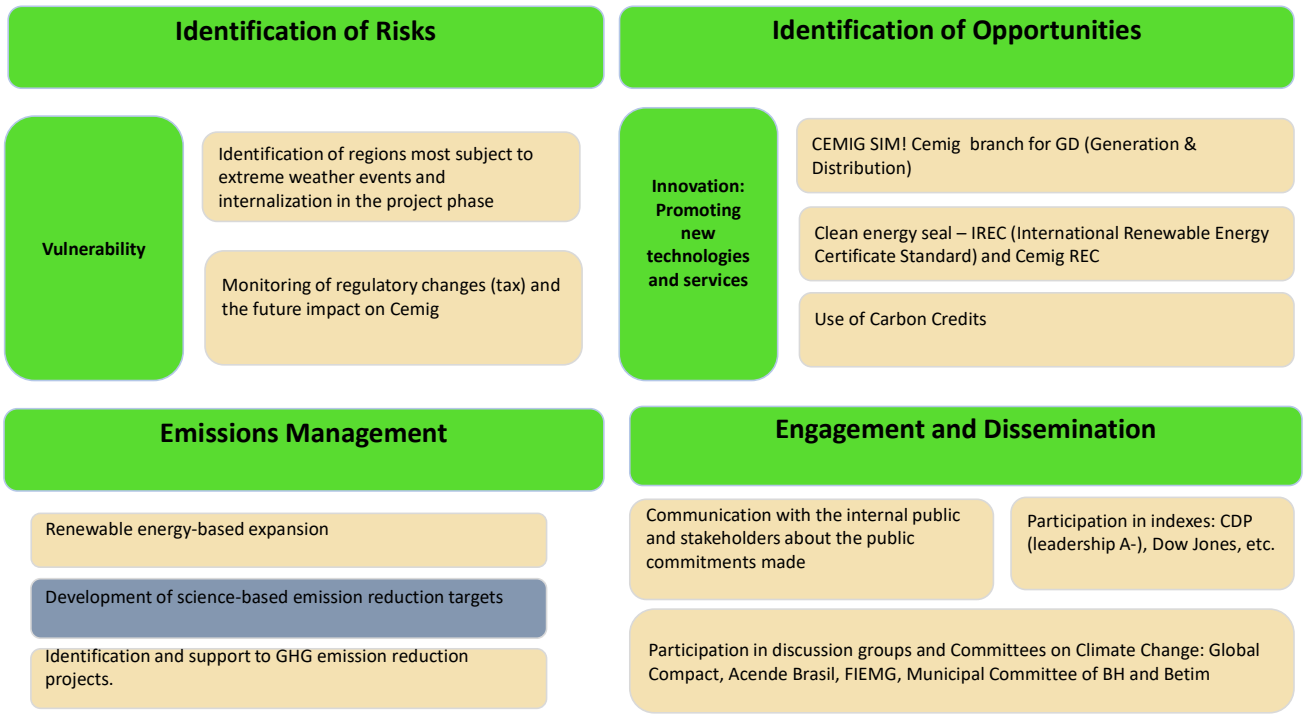
Aiming to evaluate its low-carbon transition strategy and implement best practices related to the topic, Cemig started in 2020 its participation in the **ACT-DDP project,** which aims to raise the level of decarbonization ambition of critical economic sectors, among them the electric power sector. Brazil. The alliance of the innovative methodologies ACT-Assessing Low Carbon Transition and DDP-Deep Decarbonization Pathways will allow the evaluation of the company's decarbonization strategies in relation to national and sectoral decarbonization routes consistent with the objectives of the Paris Agreement.

The project focuses on:

1. Construction of scenarios and sectorial decarbonization trajectories
2. Evaluation of the decarbonization strategies of local companies in relation to the developed routes
3. Knowledge transfer and communication on low carbon sector transition at national level
4. Communication at the international level with a focus on Latin America

In 2019, the Deputy Director approved Cemig's Climate Change Coping Strategy, which consists of: Identify risks and opportunities; promote new businesses and technologies; create clean energy seal; conduct R&D with identification of locations in Cemig's concession area subject to extreme events; position Cemig SIM as a low carbon services and products branch; do carbon credit management; have a clear indicator of the energy matrix with a defined minimum percentage of renewable energy generation sources; manage GHG emissions efficiently; develop the SBTi target; participate in Committees and Work Groups related to the topic; improve the engagement of the external and internal public; maintain participation in the main sustainability indexes.

The figure below shows the main topics that make up the company's climate strategy.



5. Climate Risk Assessment

Considering the current context of water scarcity in Brazil and the relevance of this issue and its impacts on the company's operations, an analysis considering the variation of energy purchase prices and the GSF will be presented in item 5.1.

For the medium- and long-term horizon, an analysis of scenarios referring to physical and transition risks was performed, which will be detailed in item 5.2.

From the identification of these risks, mitigation measures were listed for each associated impact.

5.1 The Water Crisis of 2021

In the short term the scenarios regarding water scarcity in the year 2021 are presented below.

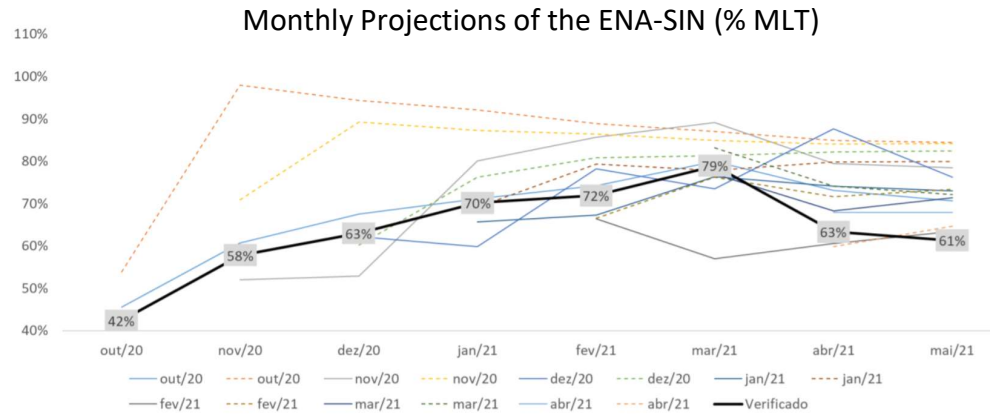


Figure 1: Evolution of the monthly projections of Affluent Natural Energy - ENA (optimistic x pessimistic scenarios) [1]

As a consequence of the low inflows, the GSF scenarios are presented below. The GSF, the acronym for hydrological risk, is a factor that calculates the difference between the energy effectively generated by the hydroelectric plants and the seasonalized physical guarantee of the hydraulic block. After the difference is calculated, the value to be compensated is divided among them.

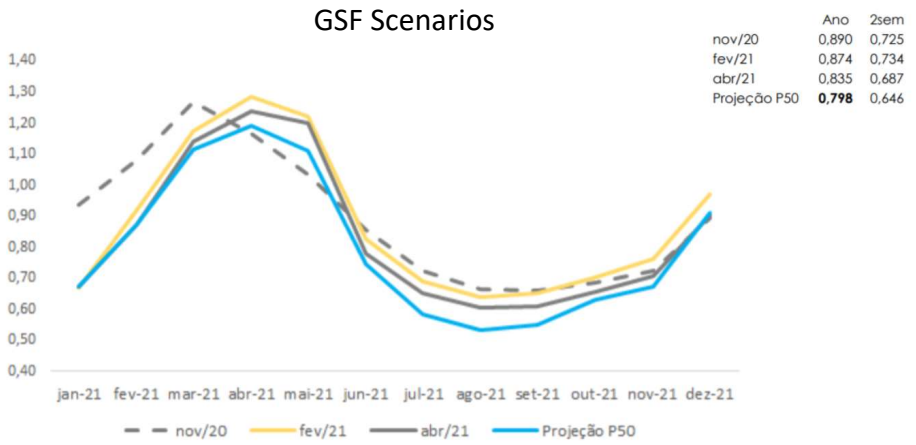


Figure 2: Hydrological Risk - GSF Scenarios

June 2021 begins with the main reservoirs of the SIN at lower levels for this time of year, which points to a horizon with prospects of reduced hydroelectric generation and increased thermoelectric production. This situation puts pressure on the costs related to hydrological risk (GSF) and the price

[1] Available at https://api.mziq.com/mzfilemanager/v2/d/716a131f-9624-452c-9088-0cd6983c1349/c10e8a59-fcc6-6c0a-8f54-919fa57366af?origin=1

of energy in the short-term market (PLD). The following chart shows the Purchases x PLD projection, that is, how Cemig has managed the issue in terms of mitigating the financial impacts.

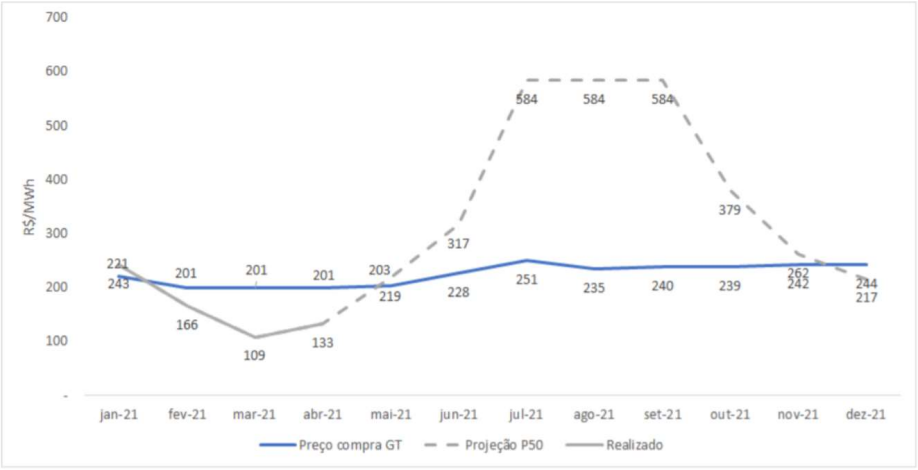


Figure 3: Variation of energy purchase prices and PLD

5.2 Scenario Analysis and Physical Risk Assessment

In order to estimate the impacts of climate change until 2100, the physical climate risk assessment was carried out using the scenario analysis available in the sixth phase of the Coupled Model Intercomparison Project (CMIP6), and until the year 2020 the data used were those related to the fifth phase of this project (CMIP5).

The Intergovernmental Panel on Climate Change's fifth report used four representative concentration "pathways" (RCPs) to represent possible futures related to greenhouse gas emissions. These scenarios are as follows:

1) RCP2.6 - Represents the scenarios for keeping the global average temperature rise below 2°C;
2) RCP4.5 - Represents a stabilization of the radioactive forcing until 2100;
3) RCP6.0 - Represents the scenarios of stabilization of the radioactive forcing at 6 W/m2;
4) RCP8.5 - Represents the scenarios with high greenhouse gas emissions.

RCP2.6 is the most optimistic scenario among the scenarios, where the radiative forcing peaks at 2.6 W.m^2. It predicts a peak CO2 concentration of approximately 490 ppm, and a decline of this value by the end of the 21st century. In this context, the increase in the earth's temperature would be between 0.3 °C and 1.7 °C from 2010 to 2100, and the rise in sea level would be between 26 and 55 cm. However, for this scenario to happen, it would be necessary to stabilize GHG concentrations over the next 10 years and then remove them from the atmosphere (MMA, 2016). The RCP4.5 scenario, on the other hand, has been one of the most widely used

scenarios and it predicts an additional 4.5 W.m-2 of energy storage and stabilization of GHG emissions before 2100. In this case, the increase in land temperature would be between 1.1 °C and 2.6 °C and in sea level between 32 and 63 cm (MMA, 2016).

Finally, RCP8.5 is a pessimistic scenario, and it is characterized by an accelerated rate of emissions, with no prediction of stabilization. This scenario predicts an additional energy storage of 8.5 W.m-2. Thus, the Earth's surface could suffer a warming between 2.6 °C and 4.8 °C over the century, and the sea level could have an increase of 45 to 82 cm (MMA, 2016; SILVEIRA et al., 2016)

These scenarios were used until CMIP5, but in the new model version (CMIP6) the new Shared Socio-Economic Pathways (SSPs) will be used.

> *SSPs are the next generation of scenarios, succeeding the SRES published in 2000, and are intended to serve as reference scenarios for various assessments in the area of climate change challenges as well as broader sustainability issues. The SSPs complement the Representative Concentration Pathways (RCPs) by adding the underlying socioeconomic narratives and quantitative pathways consistent with mitigation and adaptation challenges. SSPs include five broadly different global futures (SSP1-5) that begin in the narrative for alternative development pathways and vary depending on how energy challenges (1-5) are addressed.*
> *Source: https://www.sciencedirect.com/science/article/pii/S0959378016301224#bib0155*

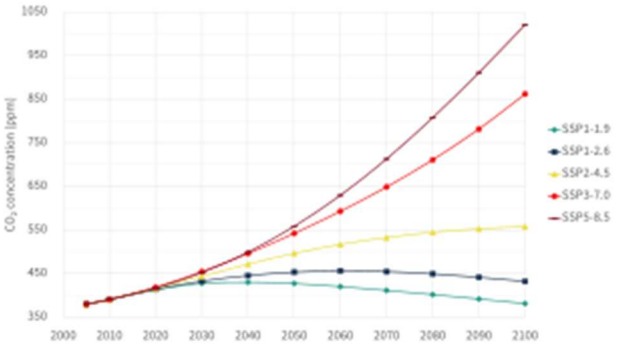


Figure 4: Atmospheric CO_2 concentrations by SSP over the 21st century (projected by MAGICC6, a simple / reduced complexity climate model).

Figure 5: SSPs mapped into the challenges for mitigation/adaptation space

Cemig analyzed the scenarios for the following variables: precipitation, temperature, humidity, wind speed and long wave radiation for five models:

a) CAMS - Chinese Academy of Meteorological Sciences - China.
b) CNRM - Centre National de Recherches Meteorologiques - France.
c) HadGEM3 - Met Office Hadley Centre - United Kingdom.
d) NOAA-GFDL - National Oceanic and Atmospheric Administration, Geophysical Fluid Dynamics Laboratory - United States of America.
e) INM - Institute for Numerical Mathematics, Russian Academy of Science - Russia.

Two horizons were used in the analyses, for each enterprise, namely:

- HOR_01 where the projections related to the concession time of the generation plants are considered
- HOR_02 that considers the renewal for another 30 years

This analysis identifies the climate risk for each of the company's plants and for others in which Cemig is interested. Considering the analysis of the scenarios described above, with the identification of physical risks, a quantitative and qualitative analysis of their impacts on the company's operations was carried out, as well as their impact on business. Another horizon of analysis was that contained in the models that make up the CMIP6, that is, from 2015 to 2100, in order to compare the long-term effects of climate change in longer horizons.

These models were applied to the SSP scenarios described and, until the next IPCC report is available, the number of models used should be expanded. The data were used to carry out the studies and analyses cited below:

1) **Changes in rainfall regimes** - As almost all of Cemig's generating capacity is composed of hydroelectric plants, changes in rainfall totals and their dispersion impact some of the company's activities. Currently, rainfall evaluations are carried out for each of the IPCC scenarios, for all the company's hydroelectric plants, in order to adjust the strategic decisions. Additionally, extreme events can also impact distribution and transmission activities, mainly related to the availability of assets.

2) **Changes in air temperature and humidity**: These two variables affect the company's business in several ways. One of the ongoing studies evaluates changes in the frequency of occurrence of wildfires near power transmission and distribution lines. These fires affect both the duration and frequency of unscheduled shutdowns of consumers, two aspects that are directly correlated with indicators related to the performance of the concession of these services.

3) **Changes in wind speed and radiation**: Although Cemig's wind and solar generation facilities do not yet represent a relevant part of the company's generation matrix, the analyses provide input for the long-term operating strategy, as well as decisions for expansion and identification of new sites. The IPCC scenarios are used as a guide to verify whether these sites will remain the most suitable or whether their performance will be impacted as a result of climate change.

For each of the meteorological variables mentioned above, the methodology applied was the same, which involves comparisons between the current climatology of the models, with a minimum of 30 years, with the climatologies predicted up to the year 2100. The analyses for precipitation have already produced several results, while those related to air temperature are in the validation stage and those related to the other variables are still in preliminary stages.

In addition to long term prognostics, Cemig operationally carries out weather forecasting at shorter horizons, with the aim of increasing its operational efficiency and enhancing the company's business competitiveness. Many aspects predicted in the IPCC reports are already showing a tangible reality, with indications that some of the climate changes are already establishing themselves and impacting the business related to energy resources. Emphasis can be given to the recent regime of water scarcity in the company's region of operation, which has affected the water availability of the generation ventures and their generation capacity.

Impacts on Water Availability

The availability of water in a given hydrographic basin is related to several physical and socioeconomic factors, but certainly the main one is the rainfall regime where the basin is located. In order to identify the impacts of climate change on this regime, the results of the models cited above were analyzed for various time horizons between 2020 and 2100.

An example of the results found is in Figure 6, below, where the actual climatology of precipitation (a) and the anomaly pattern (%) for scenarios SSP1 (b), SSP2 (c) and SSP5 (d) are presented, according to the HadGEM3

model. Regarding the CNRM model (Figure 7), the results are quite different, although the initial assumptions of each scenario are the same, the structure of the models differ.

According to HadGEM3, in the period 2070-2100, there is a strong decrease in precipitation between latitudes 10°S and 10°N and longitudes 65°W and 45°W, while south of 15°S there is a significant increase in precipitation, mainly in SSP2 and SSP5. In the CNRM model, for the same period, the changes are less intense and, in the case of Minas Gerais, with opposite sign. The other models analyzed also point to significant differences between them, therefore, the use of a larger number of models can lead to more assertive probabilistic results.

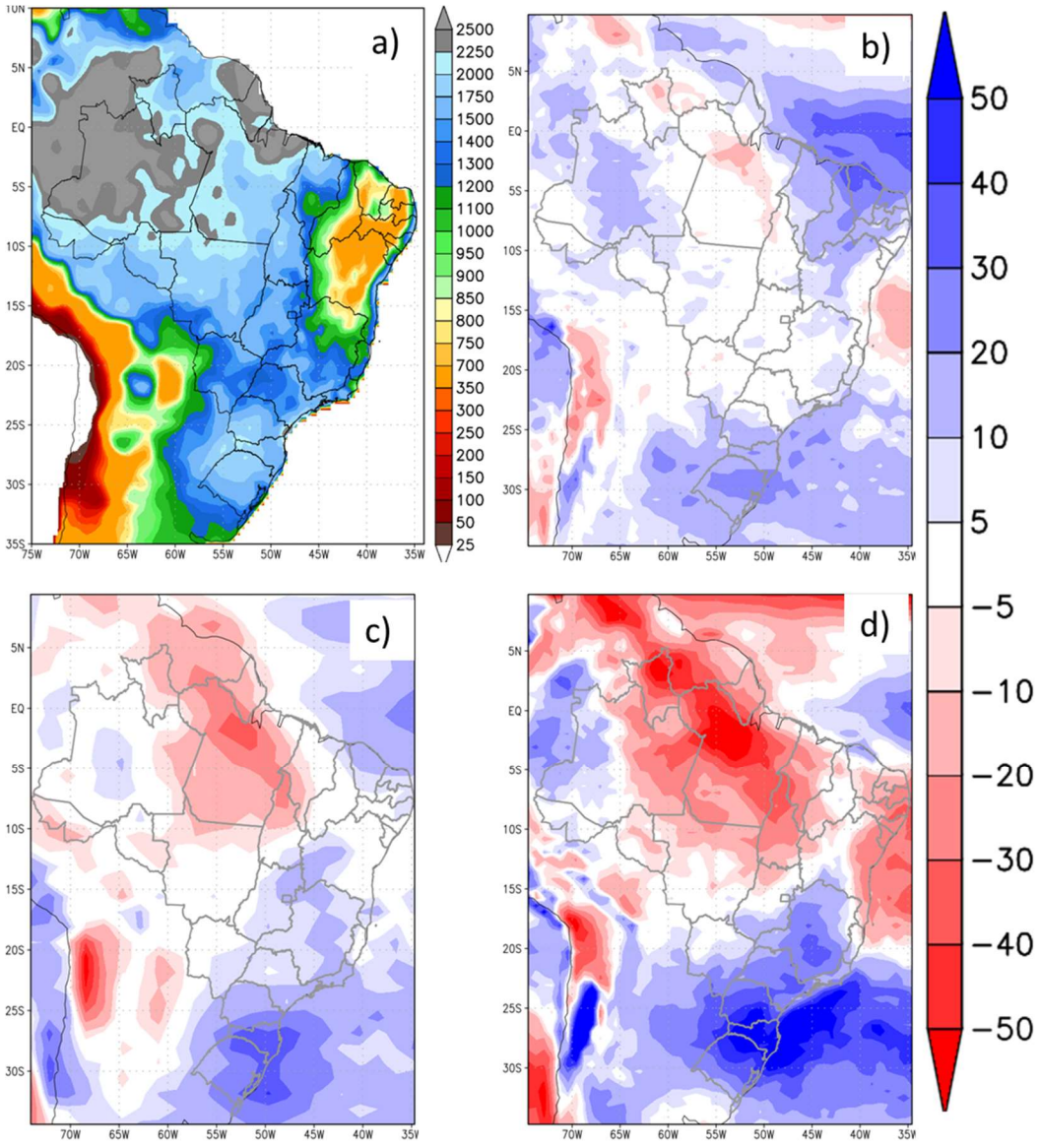


Figure 6- Current precipitation climatology (mm) (a) and the anomaly pattern (%) for the SSP1 (b), SSP2 (c) and SSP5 (d) scenarios for the period 2070-2100. Source: HadGEM3/UK.

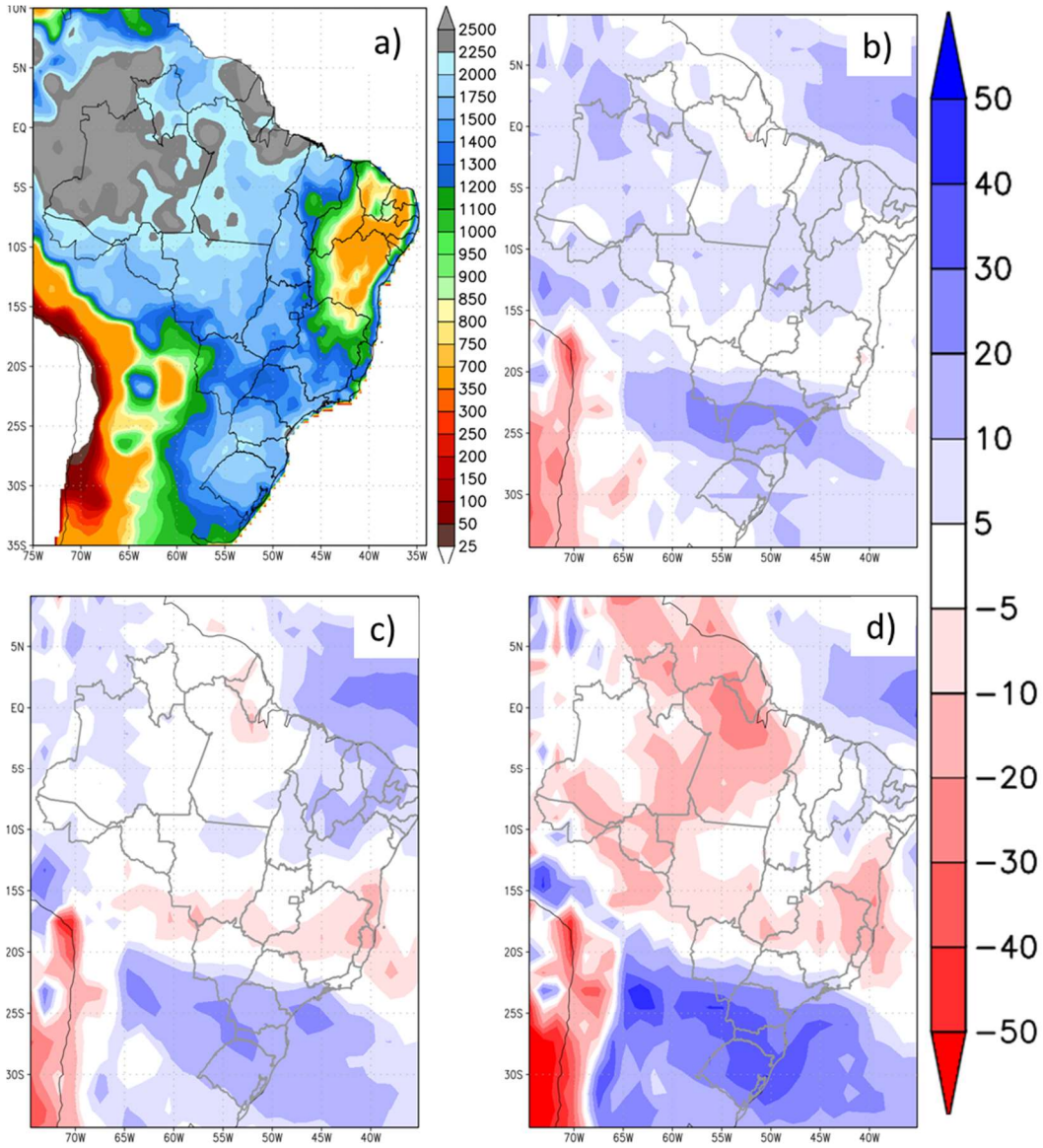


Figure 7 - Current precipitation climatology (mm) (a) and the anomaly pattern (%) for scenarios SSP1 (b), SSP2 (c) and SSP5 (d) for the period 2070-2100. Source: CNRM/FR.

Below are shown the simulations for a power plant present in the Paranaíba River Basin, as an example. The results of the CAMS and HadGEM3 models point to clearly divergent scenarios, with HadGEM3 showing an increase in rainfall in the last 30 years of the analyzed period, while CAMS indicates a decrease in precipitation. When we evaluate the average of the models, which also includes the GFDL, CNRM and INM models, it does not show a significant change in the long term.

Based on the graph in Figure 08, in the SSP2 scenario, there is a decreasing trend in precipitation over the last 30 years. In contrast, over this period, in the SSP1 and SSP5 scenarios there is a tendency for precipitation to increase by more than 10%. These results are surprising with respect to the difference between the SSP1 and SSP5 scenarios.

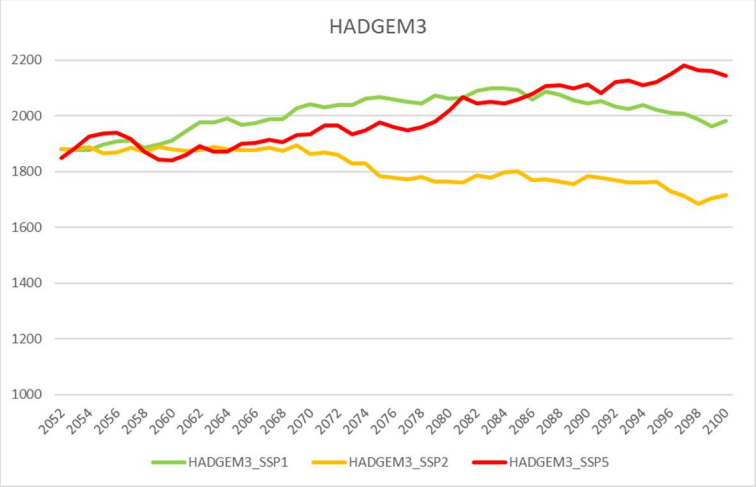


Figure 08 - Predicted 30-year moving averages for scenarios SSP1, SSP2 and SSP5. Source HADGEM3/UK.

Using the CAMS model (Figure 09), there is a tendency for a reduction in precipitation in the last 30 years of the period in all scenarios, but with emphasis on scenarios SSP1 and SSP2, which, in theory, would represent the most optimistic scenarios.

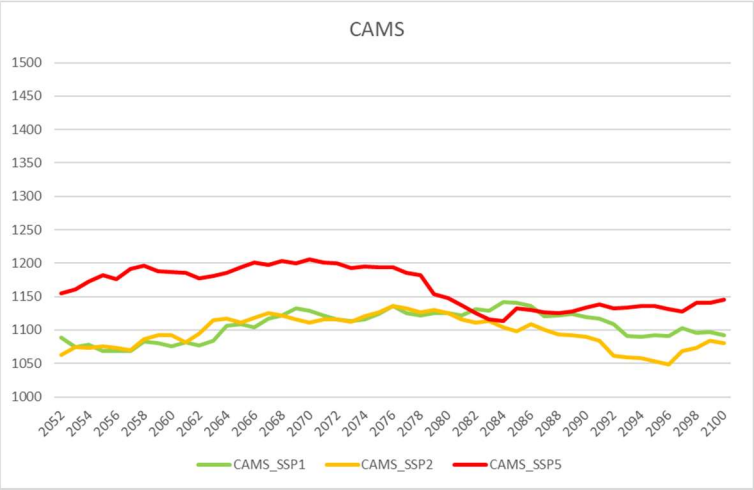


Figure 09 - Predicted 30-year moving averages for scenarios SSP1, SSP2 and SSP5. Source CAMS/CH.

When combining the average of the two models (Figure 10), one does not perceive great variations between the scenarios studied in terms of precipitation. These results exemplify the difficulty in dealing with such long horizons of climate prediction, requiring continuous analysis of new results to point out the best strategy for the company.

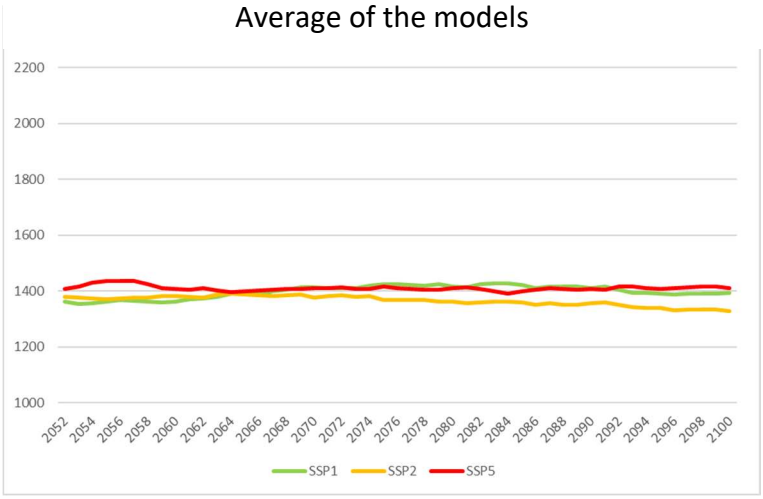


Figure 10 - Predicted 30-year moving averages for scenarios SSP1, SSP2 and SSP5, combining all 05 models.

An analysis for the river basins in which Cemig's plants are located pointed to different results, while there is a loss in the Paranaíba of up to -15% in all time horizons, there is an increase in the Jequitinhonha of more than 10%. In the São Francisco basin (in Minas Gerais) there are no significant changes. Nevertheless, in general, there is a decrease as the horizon of analysis extends, with all basins showing a decrease with respect to previous periods.

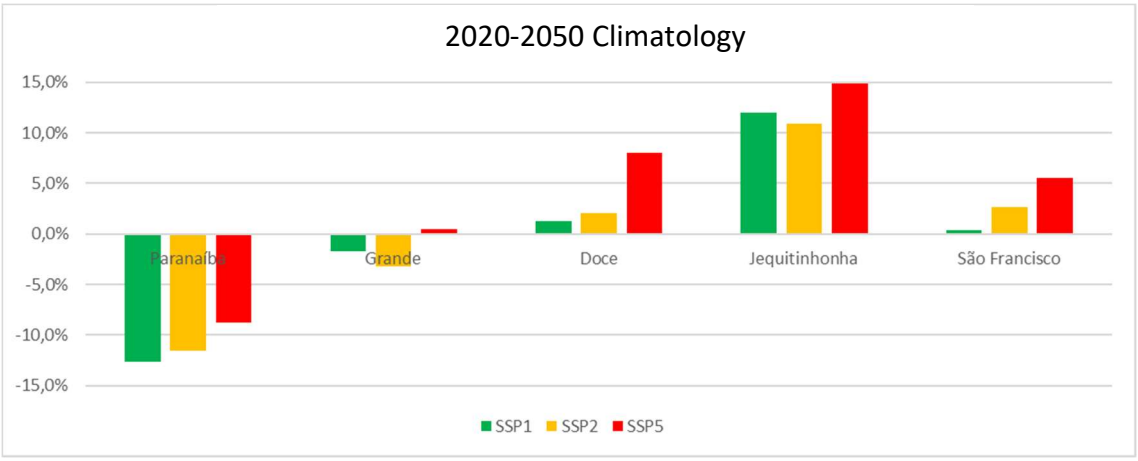


Figure 11 - Predicted anomalies for the SSP1, SSP2 and SSP5 scenarios for the Paranaíba, Grande, Doce, Jequitinhonha and São Francisco river basins in the 2020-2050 period.

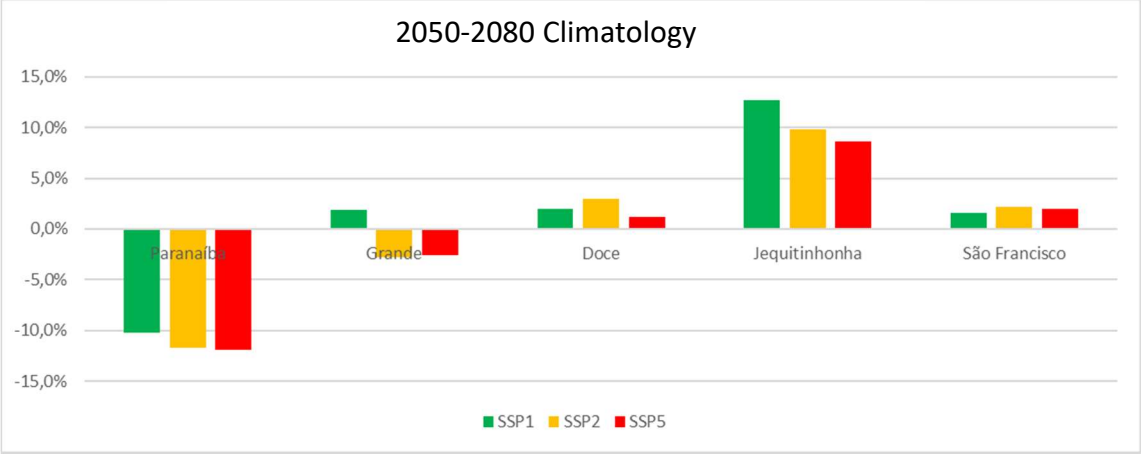


Figure 12 - Predicted anomalies for scenarios SSP1, SSP2 and SSP5, for the Paranaíba, Grande, Doce, Jequitinhonha and São Francisco river basins in the period 2050-2080.

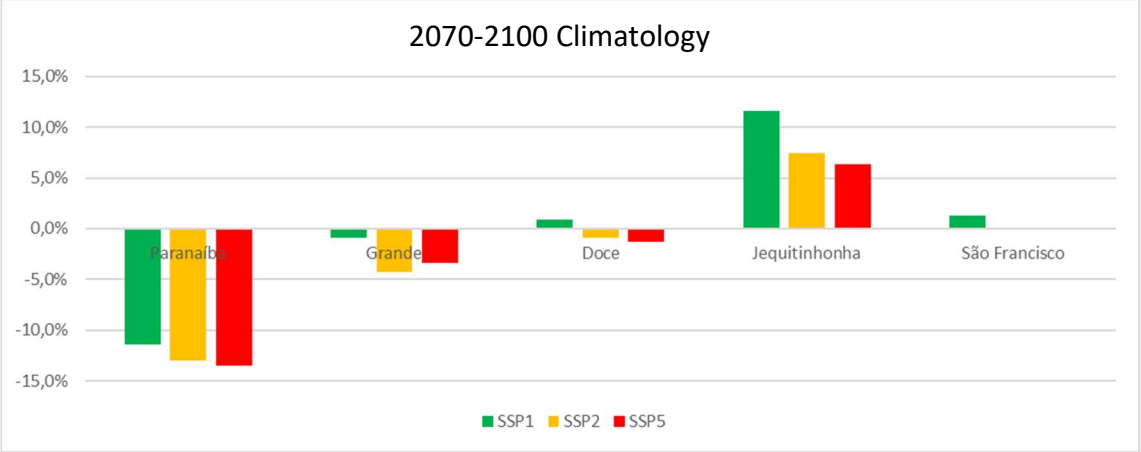


Figure 13 – Predicted anomalies for scenarios SSP1, SSP2 and SSP5, for the Paranaíba, Grande, Doce, Jequitinhonha and São Francisco river basins in the period 2070-2100.

Further analysis is needed to evaluate the financial impact of these changes on Cemig, because there are several other factors that influence the gain or loss of profitability of these plants.

Additionally, studies are being conducted to verify the impact on other atmospheric variables such as air humidity, temperature, wind, and surface radiation on the operation of power plants and transmission lines.

Temperature

In the case of air temperature, preliminary analyses show a significant increase in all scenarios (figure 14), with emphasis on SSP5, where positive deviations of more than 5°C occur in some regions of the concession area of Cemig D and in lines of Cemig T. This may reflect in the frequency of shutdowns caused by wildfires, which is directly related to temperature and decrease in rainfall.

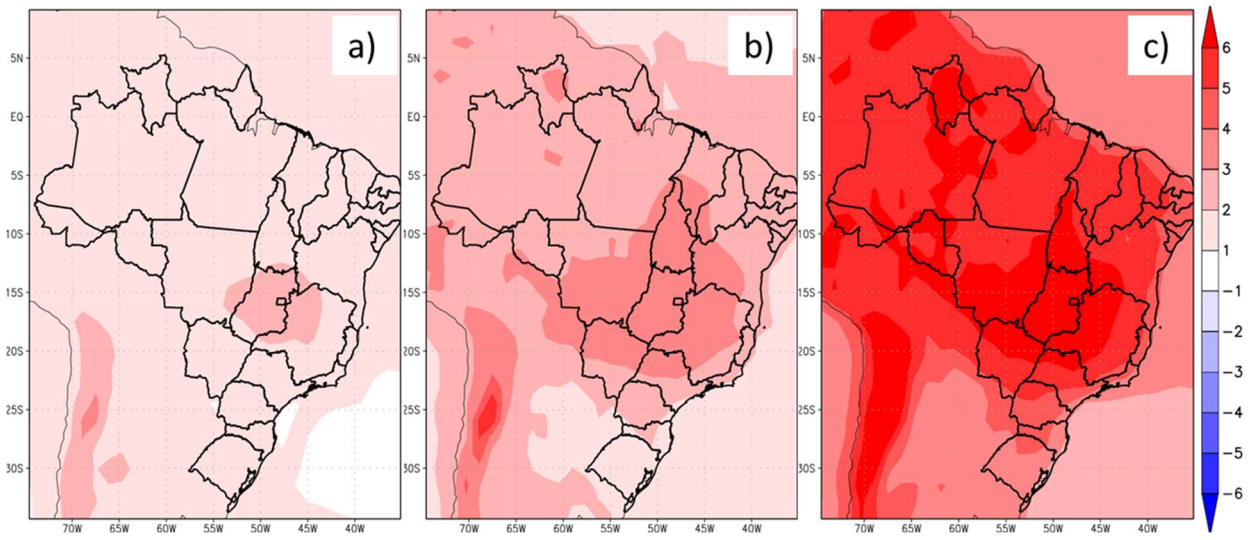


Figure 14 - Anomalies (°C) for scenarios SSP1 (b), SSP2 (c) and SSP5 (d). Source: CNRM/FR.

5.3 Transition Risk Assessment

Transition risks can be divided into four categories: political and regulatory risks, technology risk, market risk, and reputational risk.

In the political and regulatory risk, we consider the implementation of an Emissions Trading System in the country, but so far it has not been defined what type of system: cap and trade or via taxation. If the regulation of the emissions trading system occurs, it is believed that companies should mainly reduce their direct emissions of scope 1. In 2019, the only fossil fuel-fired thermal power plant was decommissioned, so Cemig's current electricity generation matrix is 100% renewable. However, this taxation is also a risk if Cemig plans to expand its fossil fuel thermal power generation business in the future, or if Scope 2 emissions are considered.

Transition Risks	Description	Impact/operating unit	Mitigation and Adaptation Measures
Current Regulation	**Regulatory changes:** Through the National Policy on Climate Change, the Brazilian government has made official its contribution to the Paris agreement, making a voluntary commitment through its Nationally Determined Contribution (NDC): to reduce greenhouse gas (GHG) emissions by 37% below 2005 levels in 2025, with a subsequent indicative contribution to reduce GHG emissions by 43% below 2005 levels in 2030. The Company considers compliance with government-imposed regulatory changes in order to meet national targets to be the main impact of this risk.	Increased operating cost, reduced revenue due to the likelihood of reduced energy consumption Cemig GT and Distribution	Currently, 100% of Cemig's installed capacity comes from renewable energy sources, predominantly hydroelectric. The strong dependence on the country's hydrological regime may lead to the need for investments in thermoelectric plants in the medium term to supply the demand for contracted electricity. If this occurs, the risk of changes in the legislation could materialize. Cemig seeks to implement measures to mitigate this regulatory impact by diversifying its generation matrix.

Transition Risks	Description	Impact/operating unit	Mitigation and Adaptation Measures
	Other regulatory risks: In order to propose measures to stimulate energy efficiency in the country, the Ministry of Mines and Energy published the National Energy Efficiency Plan (PNEf) in 2019. The PNEf adopts the goal of a 10% reduction in electricity consumption for the year 2030, referring to the consumption scenario, based on 2004. The Company considers that the reduction in demand and in the supply of electricity by Cemig to its consumers may influence the Company's results, constituting one of the impacts associated with this regulatory risk. The risk associated with the current regulation is contemplated in the Top Risk called "Inefficiency in measures to minimize and adapt to the impacts of climate change at Cemig", which is monitored annually by the company.		The company has medium- and long-term guidelines (until 2040) to expand the capacity of solar, wind and natural gas thermal generation. Additionally, there are proposals for hybridization of sources that allow a synergy for the business, seeking to optimize the operation of various sources. Another way to mitigate risk is through participation in initiatives such as the Global Compact, coordinated by the UN, which aims to align the strategies and operations of companies to the principles of corporate social responsibility and sustainability. Currently, the Global Compact is one of the largest corporate sustainability initiatives in the world and is composed of more than 80 networks covering over 159 countries, in addition to Brazil. Since 2000, Cemig has been supporting and integrating networks that are part of the Global Compact. In 2009, the Company signed a letter of adherence to the Global Compact, publicly reinforcing its commitment. Reduction of energy consumption: Participation in legal discussion forums, whether at the federal, state or municipal level, is one way to mitigate this risk, since it allows for more adequate planning, since it is possible to anticipate the facts. Cemig participates in associations such as ABRADEE, ABRATE, AGRATE and Cigré. In addition, the company promotes the Energy Efficiency Program, which provides for action with society through educational activities, modernization of equipment and implementation of alternative energy systems.
Emerging Regulation	**Carbon tax**: Through the National Policy on Climate Change, the Brazilian government has made official its contribution to the Paris agreement, making a voluntary commitment through its Nationally Determined Contribution (NDC): to reduce greenhouse gas (GHG) emissions by 37% below 2005 levels by 2025, with a subsequent indicative contribution to reduce GHG emissions by 43% below 2005 levels by 2030. Cemig's electricity generation matrix is currently 100% renewable. However, the existence of a carbon pricing instrument is a future risk if Cemig needs to expand electricity generation through fossil fuel thermal plants (natural gas) or if scope 2 emissions are considered. Thus, it was considered for the financial impact	The Company considers the creation of a national carbon pricing instrument that could lead to an increase in operating costs, the main potential impact of this risk. Cemig Generation	Cemig seeks to implement measures to mitigate this impact by defining emission reduction targets and establishing evaluation criteria for new acquisitions considering the carbon risk in *due diligence* operations, immediately minimizing the probability and magnitude of the risk. Another way to mitigate this risk is through participation in the Working Group on Climate Change and Air Quality, which is part of FIEMG's Council of Entrepreneurs for the Environment (CEMA), where discussions are held on possible changes in legislation resulting from the implementation of the National Policy on Climate Change. Cemig also participated actively in the Advisory Committee of the PMR Brazil Project, a project that ended in December 2020 and had the objective of discussing the convenience and opportunity of including the pricing of GHG emissions in the package of

Transition Risks	Description	Impact/operating unit	Mitigation and Adaptation Measures
	considering the operation of a 528 MW thermal plant with start-up in the next 6 years. If we were to consider only direct emissions the annual impact would be R$ 33 million (1,295,151 tCO2/year x 5.00US$/tonCO2 x R$5.10/US$). The risk associated to the emerging regulation is contemplated in the Top Risk called "Inefficiency in measures to minimize and adapt to the impacts of climate change at Cemig", which is monitored annually by the company.		instruments aimed at implementing the National Policy on Climate Change (PNMC) in the post-2020 period. The analyses carried out during the project suggest that the implementation of a carbon pricing instrument in the national climate policy for the post-2020 period is desirable.
Technological	**Accelerated Technological Advancement:** The electric sector has constantly gone through transformations of a technological nature that imposes an increasingly faster adaptation capacity on the sector's agents. The technological risk is contemplated in the Top Risk denominated "Inefficiency in measures to minimize and adapt to the impacts of climate change at Cemig", which is monitored annually by the company.	The Company considers the loss of market, customers and, consequently, revenue as the main potential impact of this risk. Cemig may have its business impacted by new technologies in the medium and long term if it does not develop strategic partnerships or is unable to implement the technological changes in its services. Cemig GT and Distribution	Cemig seeks to implement measures to mitigate this impact by investing in research, development and innovation, always seeking to continuously improve its processes, reduce its greenhouse gas emissions and prepare for the effects of climate change - considering energy alternatives and energy efficiency. The company has defined a medium- and long-term strategic initiative to explore new technologies and opportunities such as *smartgrid*, hybrid generation, energy storage, "electro stations", digitalization, among others, in order to mitigate this risk and leverage opportunities. As a way to make this strategic initiative viable, Cemig launches annual R&D calls for proposals focused on the mapped opportunities. In 2020 R$6.8 million were spent on R&D focused on the environment. The reduction in investments compared to the previous year is due to the contingency of resources to ensure priority actions, ensure essential services and meet regulatory restrictions derived from the impacts of the Covid-19 pandemic in the electricity sector.
Market	**Cap-and-Trade Schemes:** The establishment of a cap-and-trade GHG emissions trading market in Brazil may entail a need for greater planning by Cemig with respect to meeting the specific regulations of the market, particularly with respect to monitoring and verification of emissions. The market risk is included in the Top Risk denominated "Inefficiency in measures to minimize and adapt to the impacts of climate change at Cemig", which is monitored annually by the company.	Increased operational cost, if the company invests in non-renewable sources of energy generation. Cemig GT and Distribution	To mitigate this risk, Cemig seeks to identify projects that generate carbon credits and long-term contracts with verification and certification companies, thus reducing the probability of this risk materializing for the Company. Furthermore, when evaluating the acquisition of projects that use fossil fuels, Cemig performs internal analyses regarding the carbon risk and its financial impact to the company, i.e., the financial risk of the project in a possible future scenario of GHG emissions pricing in Brazil.

Transition Risks	Description	Impact/operating unit	Mitigation and Adaptation Measures
			The company participates in the CDP Benchmark Club Program, which enables it to improve its internal practices and review its GHG emissions reduction targets. Another way to mitigate this risk is through participation in the Working Group on Climate Change and Air Quality, which is part of FIEMG's Council of Entrepreneurs for the Environment (CEMA), where discussions are promoted about possible changes in legislation resulting from the implementation of the National Policy on Climate Change, such as the creation of a carbon pricing instrument. Cemig also participated actively in the Advisory Committee of the PMR Brazil Project, a project that ended in December 2020 and had the objective of discussing the convenience and opportunity of including the pricing of GHG emissions in the package of instruments aimed at implementing the National Policy on Climate Change (PNMC) in the post-2020 period. The analyses carried out during the project suggest that the implementation of a carbon pricing instrument in the national climate policy for the post-2020 period is desirable.
Reputation	**Image and Reputation:** Cemig evaluates the impact of image and reputation in all its strategic risks prioritized by the Board of Directors, the so-called Top Risks. Specifically, for the dimension image and reputation, the impact of the risks can be graded in one of 6 ranges. These ranges from very low (possible exposure among the sector's employees, but reversible through actions to be taken by the process manager) to catastrophic (Compromise of the image, at an international level, before regulatory agencies, financial institutions, customers, society, opinion formers, market and media). If Cemig needs to expand its energy supply by means of fossil fuel-fired thermal power plants, it may be criticized by society, impacting the value of the brand. A worsening of Cemig's sustainability indicators could occur, leading to a reduction in the company's score in questionnaires such as the ISE (B3's Corporate Sustainability Index) and the DJSI (Dow Jones Sustainability Index). In an extreme case, this risk could lead to Cemig not being included in the portfolios	Brand devaluation. Cemig Group	Cemig has always had a great reputation, considered a sustainable company with a high performance in ESG indexes, and the maintenance of this image will be increasingly associated with the adoption of best practice recommendations in climate strategy. To maintain its leadership in sustainability, the company has a Sustainability Committee and a Sustainability Plan that defines the main ESG actions. In addition, the company participates in the CDP Benchmark Club Program, which enables the improvement of its internal practices.

Transition Risks	Description	Impact/operating unit	Mitigation and Adaptation Measures
	of these sustainability indexes in a given year, resulting in a drop in market value and deterioration of the company's reputation with investors		

6. Physical Risk Adaptation Plan

Adaptation to climate change can be understood as anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage it may cause or to take advantage of opportunities that may arise.

To elaborate the Adaptation Plan to the Physical Risk of the climate, the impacts estimated through the scenario analysis described in item 5.2 were considered, the adaptation measures are presented in the table below:

Physical Risks	Description	Impact/operating unit	Adaptation Measures
Change in precipitation pattern	Climate change can cause changes in the seasonal rainfall patterns, with extreme rainfall and drought events, changes in the geographic distribution and in the average precipitation values, impacting the amount of water that reaches the plant reservoirs. As Cemig's electricity production is mostly hydraulic, these changes can cause a reduction in the generation capacity. Historically the Company has already been experiencing the impacts of these risks in the last 5 years due to the water shortage in the basins where it has hydroelectric generation projects.	Structural changes in water productivity (average and volatility). Cemig Generation	This risk is mitigated through the Diversification of the electric matrix by expanding the generation of energy from wind and solar sources. Cemig established in its strategic planning the target of Add ~1GW of installed capacity (~450 MW) by 2025, with investment of R$4.5 billion focused on renewable sources and increasing efficiency of the portfolio e Invest R$ 1bn by 2025, in projects for Distributed Generation operation in verticalized solar farms (equivalent to 275MWp), as demonstrated in https://api.mziq.com/mzfilemanager/v2/d/716a131f-9624-452c-9088-0cd6983c1349/3dd398cb-c15a-8d2f-9f3b-fe8a18237159?origin=1, slides 28, 29 and 44. Another action is the efficient management of the reservoir with increased assertiveness of the numerical weather and climate forecast. To this end, hydrological models are used to subsidize short term decisions, as well as medium term analyses.

Physical Risks	Description	Impact/operating unit	Adaptation Measures
Intensification of extreme events	The occurrence of intense rainfall in a short period of time, accompanied by windstorms and lightning, can cause physical damage to the facilities that transport and distribute energy, leading to their unavailability and an increase in Cemig's costs, caused by the reimbursement to consumers due to interruptions in the supply of energy (DEC and FEC indicators). These phenomena are increasingly associated with the effects of an unfavorable microclimate, typical of large urban centers. Fires, within the easements or in their vicinity, can cause occurrences of unavailability of the transmission lines. Cemig's operation areas that could be most affected by forest fires would be the Triângulo Mineiro and the metropolitan regions in the state of Minas Gerais.	Interruption of power supply, impacting the quality of the service provided and damage to assets. Cemig Transmission and Distribution	The management methods seek to reduce, in the medium term, the magnitude of this risk through preventive adaptation measures, such as the management of urban forestation, the operation of climatological stations and of the meteorological radar, which forecasts with greater precision the occurrence and intensity of storms, and the emergency plan with the allocation of maintenance teams for the rapid reestablishment of the energy supply. Cemig also carries out the Cemig D Distribution Development Plan - PDD, which includes investments in the maintenance and modernization of the electricity distribution network. The company aims to be Leader in client experience (top 3 in NPS) and safety – with performance at least at regulatory levels (increase Ebitda by R$ 1bn, DEC at 95% of regulatory limit, FEC at 70% of regulatory limit) – prepared for the future through investments in smart grids, smart networks, digitalization and analytical capacity. Capex R$12.5 bn (2021-2025) as demonstrated in https://api.mziq.com/mzfilemanager/v2/d/716a131f-9624-452c-9088-0cd6983c1349/3dd398cb-c15a-8d2f-9f3b-fe8a18237159?origin=1 , slide 39 Fire: The mitigation measures for this impact are awareness campaigns, a fire alert system, and fire prevention manuals.
	Patterns of precipitation at extreme levels concentrated in time	Damage to power plant facilities and damage to the community through flooding and inundation in cities Cemig Generation	The adoption of hydrological models that transform rainfall x flow allow for the prognosis of future flow scenarios. In this sense, in order to evaluate the risk associated with extreme events, analyses are made by ensemble forecasts, in order to obtain a cloud of probabilities and define the risk strategy for each situation. As a risk management tool, the Proximity application establishes the company's relationship with the community for flood warning and control instrument by the civil defenses.

7. Identifying Opportunities

The company considered the Brazilian NDC implementation scenario for opportunities related to transition risks and SSPs scenarios 1 to 5 for opportunities related to physical risk.

Cemig considers short term the time horizon of up to one year and medium term, (1 to 7 years). This time horizon is aligned with the period covered by the Company's Multi-Year Business Plan, which reflects the assumptions of the Long-term Strategy and contains the goals for at least 5 years including the Annual Budget and long term (7 to 21 years). This time horizon is aligned with the period covered by the Company's Long-term Strategy (2019-2040).

Risk	Opportunity	Time horizon
Transition Risk: Regulatory Change	Compliance with regulatory requirements and the emergence of new international agreements may create opportunities for Cemig, since the company, having a predominantly renewable energy matrix (installed capacity 2020: 98.1% hydraulic and 1.9% wind and solar) and with low carbon emissions, is better prepared than its competitors to adapt to this scenario. The establishment of a cap-and-trade emissions trading market in Brazil or worldwide, along the lines of the CDM - Clean Development Mechanism-, for example, could position Cemig as an important supplier of emission reduction certificates. This opportunity could lead to increased revenue for Cemig.	Long Term
Physical Risk: Increase in the average temperature	Increased energy consumption The likely increase in average temperatures will cause changes in consumption patterns, such as, for example, increased use of ventilation and cooling systems, which will result in increased energy demand. A study conducted by Rodrigues et al. (2013) evaluated the possible impact of climate change on residential electricity demand, based on projections of increase in average quarterly temperature according to the GHG emission scenario of the IPCC 4th Report. The results suggest that residential electricity demand in Brazil may increase in response to the projected increase in temperature. Considering that Cemig has more than 7.1 million residential consumers in the State of Minas Gerais, taking advantage of this opportunity will bring a substantial increase in the company's revenues.	Medium Term
Transition Risk: Market	Sale of energy efficiency projects: In a scenario of greater corporate investments in energy efficiency aimed at reducing energy consumption and consequently GHG emissions, Cemig SIM's subsidiary will possibly have an increase in demand for its services, including implementation of projects to use LED lighting, cogeneration, distributed generation and other energy solution services. It is noteworthy that these projects are carried out through performance agreements where Cemig SIM	Short Term

Risk	Opportunity	Time horizon
	contributes with the necessary resources and recovers its investment through the savings of these projects. In this context, Cemig SIM may also have an increase in demand for consulting services for implementation of an Energy Management System based on ISO 50001. Cemig SIM was created in October 2019, resulting from the merger of the operations of the companies Efficientia and Cemig GD, to operate in the market of distributed generation, energy efficiency and energy solutions. In addition to the branding and marketing strategy focused on retail and digital transformation of the electricity sector, SIM's organizational culture, with a strong innovative and technological character, is being built so that customers are always at the center of decisions. In 2020, Cemig SIM provided 2,024 clients with the opportunity to consume 3,962MWh/month, energy generated by ten photovoltaic plants (Janaúba, Corinto, Manga, Bonfinópolis II, Lagoa Grande, Lontra, Mato Verde, Mirabela, Porteirinha I e Porteirinha II)	

8. Emissions Management and Targets

As defined in its climate strategy, the company manages its emissions through the Greenhouse Gas Inventory (GHG). The results of the annual inventory are fundamental for (i) the effective management of the company's emissions, being the basis for the evaluation of climate-related risks and opportunities; (ii) the establishment of emission reduction targets; (iii) the prioritization and monitoring of emission mitigation actions; and (iv) the participation in programs for the disclosure of climate management and the comparison of the company's performance against other companies in the sector.

CEMIG defined two tCO2e emission targets in 2018. The first of these consists of an absolute target based on the combination of Scope 1 and 2 emissions, while the second is an intensity target for Scope 2 based on emissions from total losses in electricity transmission and distribution. As a reference, the target year 2022 and base year 2017 were determined for total emissions. For scope 1 emissions we adopted the following criteria: maintain the percentage of SF6 emissions at a maximum of 0.66% (SF6 emission (kg)/total installed quantity (kg)); and reduce 10% of emissions from mobile sources in relation to the 2017 value. Regarding the scope 2 emissions, the following criteria were defined: maintain the electricity consumption at 156,773 GJ (2017 value), have 12.56% total losses in 2020 and 11.53% in 2021 and 11.24% in 2022.

The company has also been moving toward the development of a Science Based Target (SBT), committing to limiting global warming to below 2°C. The base year will be defined according to the reduction projection stipulated by the SBT methodology.

For more information, please refer to the GHG Emissions Inventory, available at: https://www.cemig.com.br/en/relatorios/greenhouse-gas-inventory/

9 Concluding Remarks

The Scenario Analysis performed in this study will continue to be improved by the company with the involvement of new areas of the company in order to enable the quantification of the financial impact on the company's assets, as well as new analyses on the divergent results presented in the climate models. Other practices are also being structured for 2021, such as the commitment to the development of the science-based target for the reduction of greenhouse gas emissions and the Low Carbon Transition Plan.

The incorporation of the TCFD recommendations on climate-related financial disclosures will be implemented with the involvement of the risk, sustainability, environmental and energy planning areas. After mapping the practices, the information will be published in the 2021 Annual and Sustainability Report.