



CLIMATE-RELATED FINANCIAL
DISCLOSURES REPORT

2023



CEMIG

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01. ABOUT CEMIG

Companhia Energética de Minas Gerais (Cemig) operates in the areas of generation, transmission, commercialization and distribution of electricity, energy solutions (Cemig SIM) and distribution of natural gas (Gasmig). The group consists of the holding company Companhia Energética de Minas Gerais (Cemig), the wholly owned subsidiaries Cemig Geração e Transmissão S.A. (Cemig GT) and Cemig Distribuição S.A. (Cemig D), totaling 102 Companies, 9 Consortia and 2 FIPs (Equity Investment Funds with assets and businesses in several states of Brazil).

Cemig is a publicly traded company, controlled by the Government of the State of Minas Gerais (51%), with its shares traded in São Paulo, on B3 S.A. (Brasil, Bolsa, Balcão), in New York, on the New York Stock Exchange (NYSE) and in Madrid, on the Latin American Stock Market (Lati-bex). The Company's consolidated net operating revenue reached R\$ 34 billion in 2022, based on a 100% renewable energy matrix.

Cemig's power park has an installed capacity of 5,519.65 MW, of which 95.73% refers to hydraulic generation; 2.63% to wind generation; 0.07% to solar generation, and 1.57% to distributed generation. Figure 1 shows the current location of the company's plants. The company's current generation is 18,275,919.0 MWh. At the end of 2022, the Company had 60 Hydroelectric Plants (HPPs), Small Hydroelectric Plants (SHPs) and Hydroelectric Generating Plants (CGHs), two photovoltaic plants and seven wind complexes. The organization has a total of 5,016 km of transmission lines. In the area of electricity distribution, it is responsible for the management of the largest electricity distribution network in Latin America, with 565,144 km of extension.

Due to its commitment to the principles of socio-environmental responsibility, its economic and financial strength and technical

excellence, Cemig is internationally recognized as a reference in sustainability in its sector of operation and is positioned as one of the main vectors of consolidation of the Brazilian electricity sector. The organization has been part of the Dow Jones Sustainability Index (DJSI World) for 23 years, being the only company in the electricity sector in the Americas to be recognized on the list. It also participates, for the 18th consecutive year, in the Corporate Sustainability Index (ISE) of B3 and was selected for the 13th time to compose the Carbon Efficient Index (ICO₂), created in 2010 by B3 and BNDES.

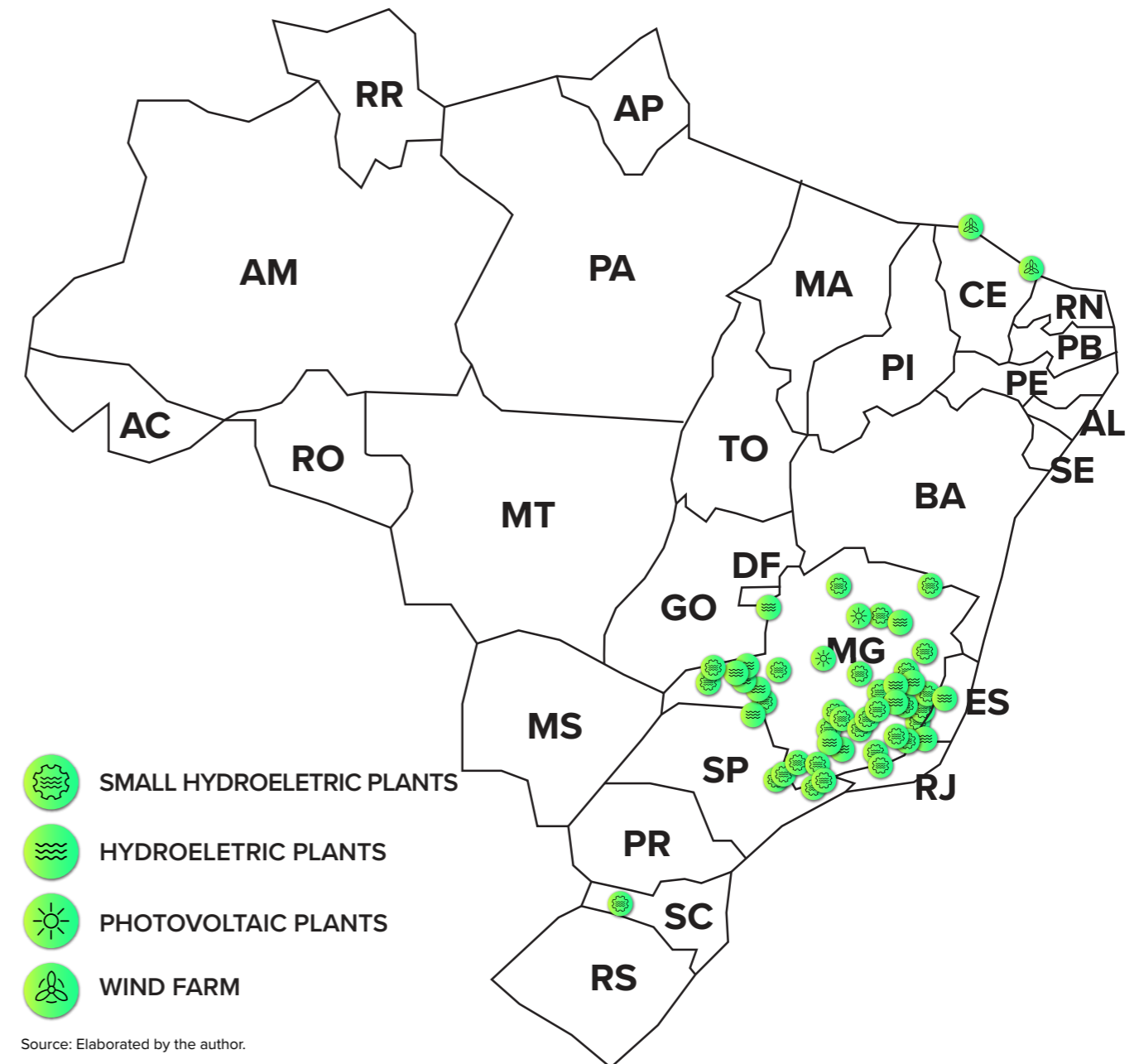
Seeking to make increasingly ambitious climate commitments, Cemig has been striving in all areas of activity to monitor the relevant indicators and prioritize initiatives aligned with a low-carbon future. Since 2011, the Company has disclosed the inventory of greenhouse gas emissions with independent verification, identifying the main sources of emissions and seeking to develop appropriate strategies. Assuming commitments increasingly aligned with the climate agenda, at the end of 2019, its only thermoelectric plant – the Igarapé TPP – was deactivated, making its energy generation complex 100% renewable, which represented a milestone in the Company's trajectory. Cemig also actively participates in several national, international, and local

THE COMPANY'S CONSOLIDATED NET OPERATING REVENUE REACHED R\$ 34 BILLION IN 2022, BASED ON A 100% RENEWABLE ENERGY MATRIX.

initiatives, having been one of the first companies in the country to join the Alliance for Climate Action (ACA-Brazil), a coalition to fulfill

the commitments of the Paris Agreement, and actively participating in the Climate Change Working Group of the Federation of Industries of the State of Minas.

Figure 1. Location of Cemig Group Power Plants



Source: Elaborated by the author.

In 2022, as part of the matrix's diversification strategy, Cemig SIM acquired 100% of the interest in special purpose companies that own three photovoltaic solar power plants, and Cemig GT announced the implementation of the Boa Esperança and Jusante photovoltaic solar plants. In the same year, Cemig's Board of Directors approved the adherence to the **Net Zero Ambition Movement**, an acceleration initiative that aims to challenge and support companies that are part of the UN Global Compact – which aims to reduce the company's emissions and achieve emissions neutrality by 2040 – and reviewed the Company's strategic planning for the period between 2023-2027. In this process, which involved the areas of risk, strategy and financial planning, the goals of the Board of Directors were also approved in alignment with the company's strategy, including the objectives related to climate.

For the year 2023, Cemig has defined as an important step in the decarbonization process the elaboration of its Transition Plan, in line

with the recommendations of frameworks and initiatives such as the CDP (formerly known as the Carbon Disclosure Project), the Transition Plan Taskforce (TPT), and the Assessing Low-Carbon Transition (ACT). The Transition Plan will clearly outline how the company should manage its assets, operations, and business models to net zero emissions by 2050.

In line with its values of integrity, commitment, sustainability, and social responsibility, Cemig publishes, for the second consecutive year, the Report on Climate-Related Financial Disclosures (TCFD), with the aim of providing transparency to its efforts and actions to mitigate and adapt to climate change.

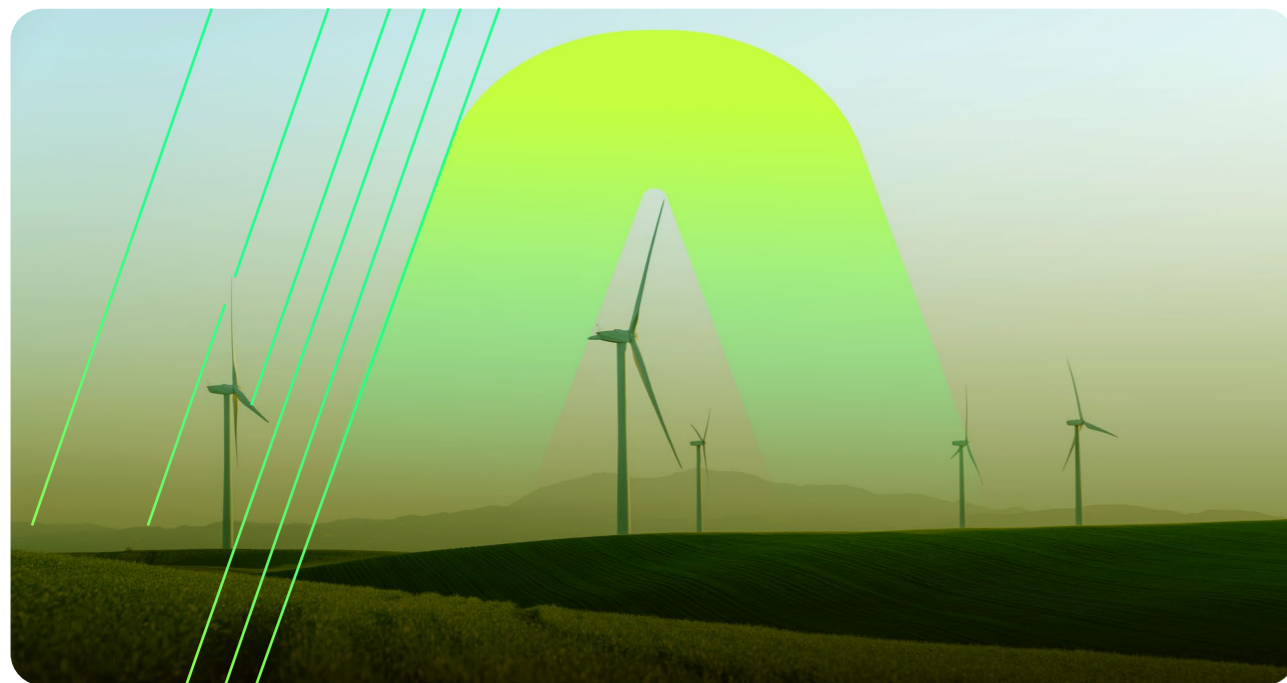


Photo by Zac Wolff on Unsplash

O2. ABOUT TCFD

The Task Force on Climate-Related Financial Disclosures (TCFD) is the Task Force created in 2015 by the Financial Stability Board (FSB), an international body that monitors and makes recommendations on the global financial system. The purpose of this Task Force is to develop voluntary guidelines and recommendations so that companies are able to provide relevant and timely information to all stakeholders about the risks and opportunities associated with climate change.

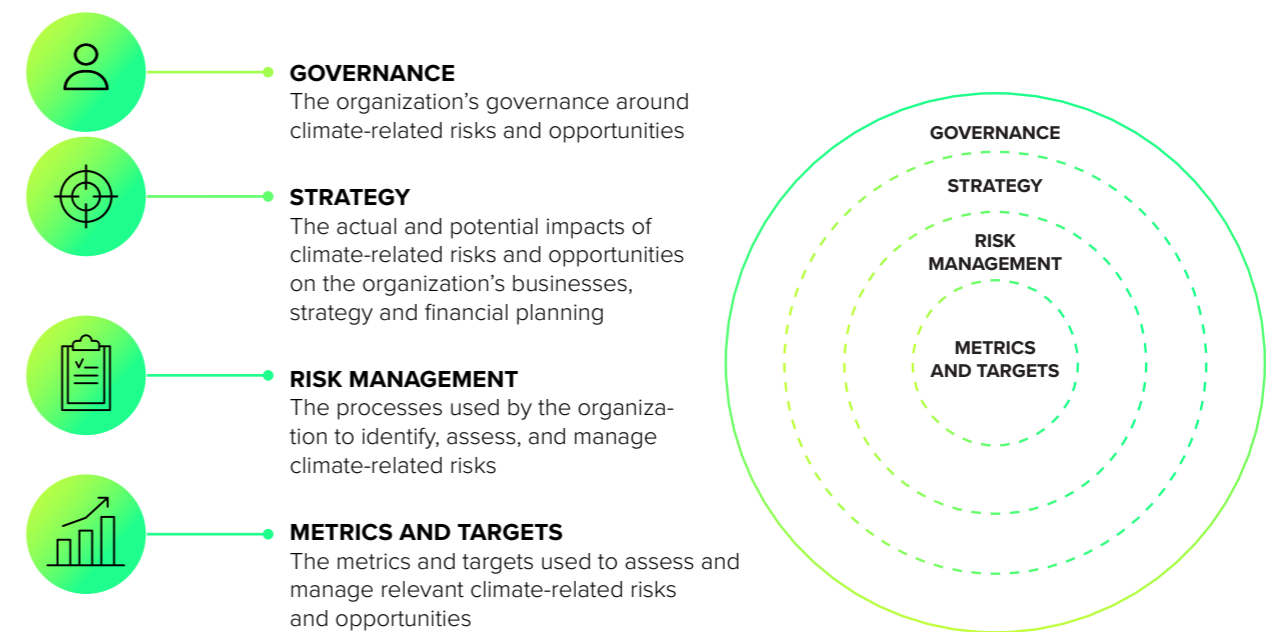
The disclosure recommendations are structured around four thematic areas representative of the core elements of the companies' operations: Governance, Strategy, Risk Management and Metrics and Targets (as shown in Figure 2). The four areas are interrelated and supported

by eleven recommendations that build the framework with information that should help investors and other stakeholders understand how reporting organizations think about and assess climate-related risks and opportunities.

In addition to the general recommendations and guidelines, the TCFD also proposes complementary guidelines for those sectors that represent the highest proportion of GHG emissions, as in the case of energy services.

2.1 | TCFD Recommendations

Figure 2. Core elements of financial disclosures related to climate change.



Source: [Recommendations of the Task Force on Climate-related Financial Disclosures, 2017](#)

To support the development of high-quality disclosures that allow users to understand the impact of climate change on organizations, the Task Force recommends that companies consider seven principles. In order to ensure effectiveness, disclosure should be:

1. Providing relevant information
2. Specific and complete
3. Clear, balanced, and understandable
4. Consistent over time
5. Comparable between companies in a sector, industry, or portfolio
6. Reliable, verifiable, and objective
7. Provided in a timely manner

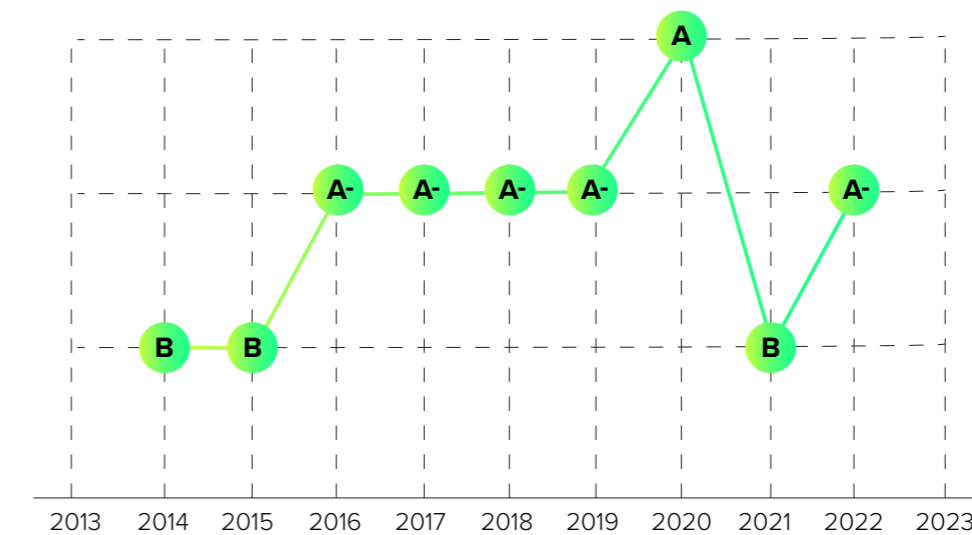
Cemig has been following these principles in its financial and integrated reporting. In the TCFD Report, the strategies are presented, as well as climate change mitigation and adaptation actions implemented and to be implemented. The Company recognizes that a significant effort will be required to achieve the goal of net-zero emissions by 2040. In this trajectory, it seeks to encourage and strengthen innovation, process improvements, investments in new technologies and collaborative partnerships that foster effective solutions in the energy sector.



2.2 | TCFD and the energy sector

In its latest TCFD 2022 Status Report, the Task Force found that, in 2021, energy companies had the highest average percentage of disclosure among the eight industries¹ analyzed, highlighting the increasing disclosure of risks and opportunities since 2019. In line with this trend, Cemig has given increasing transparency to its climate-related information, mainly through the CDP report, a framework that since 2018 has been aligned in several points with the TCFD guidelines, which Cemig makes publicly available and whose results are presented in Figure 3.

Figure 3. Cemig performance in reporting to the CDP Climate Change questionnaire between 2014 and 2022
CEMIG SCORES | CDP CLIMATE CHANGE



Source: Elaborated by the author.

Another relevant finding of the study is that many of the energy companies still do not report the participation of the Board of Directors in the observance of climate issues, as well as data on greenhouse gas emissions in the respective scopes and information that proves a climate resilience strategy. Cemig distinguishes itself on these fronts due to its long-standing commitment to integrating climate issues into the company's strategy. The Company has a well-established governance and risk management system to address these challenges and annually publishes its Greenhouse Gas Inventory, which guides the implementation of several actions aimed at promoting

greenhouse gas reduction goals, in line with the decarbonization trajectory and the transition plan that is still under construction.

The following sections deal in detail with the advances made by Cemig in accordance with the central elements and recommendations of the TCFD and in line with the ambitions that the Company has been establishing in order to contribute to a sustainable future.

¹- Sectors covered in the report: Banks; Insurers; Energy; Materials and Buildings; Transport; Agriculture, Food and Forest Products; Technology and Media; and Consumer Goods. A total of 1434 companies were analyzed.

03. OVERVIEW

In Table 1 below, we provide a summary of the 2022 highlights, highlighting progress and transparency within the four thematic areas around which the Task Force has structured its recommendations, and which represent the core elements of the organizations' operations: Governance; Strategy; Risk Management; Metrics and targets.

Table 1. Summary of TCFD 2022 reporting highlights

	<p>GOVERNANCE</p> <ul style="list-style-type: none"> Cemig defined its growth strategy in generation focused on renewable sources The company joined the Net Zero Ambition Movement of the United Nations (UN) Global Compact Cemig submitted science-based targets to the Science Based Targets initiative for approval The construction of photovoltaic plants was subject to analysis and approval by the Board
	<p>STRATEGY</p> <ul style="list-style-type: none"> Cemig maintains its focus on clean energy sources (or full compensation of impacts) The commercialization of Renewable Energy Certificates – Cemig REC and I-REC was expanded The scenario analysis was updated with expansion of the coverage and depth of the study aiming at more informed decision making The process of identifying the main climatic hazards – especially water scarcity and fires – to which Ce-mig's assets are most exposed is ongoing The company detailed the mitigation actions that have been implemented in line with the new Strategic Planning, with an investment of R\$ 42.1 billion planned in modernization, expansion, and innovation actions
	<p>RISK MANAGEMENT</p> <ul style="list-style-type: none"> Climate risk management processes are transparent and well-defined Among the risks mapped, the change in the precipitation pattern, associated with water scarcity, and the risk of increasing the frequency and intensity of extreme weather events, such as cyclones and floods, were highlighted In 2022, the cost of risk management totaled R\$ 1,366,016,736.24 and the cost of opportunity management totaled R\$ 1,450,000.00



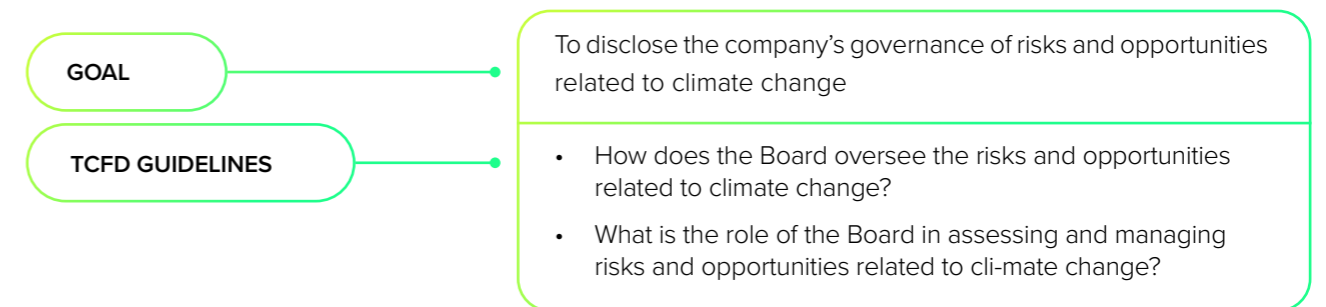
METRICS AND TARGETS

- The Company's new goals include targets submitted for approval by the Science-Based Targets initiative
- The Emissions Inventory indicates a 48% reduction in the company's total emissions and a 55% reduction in emissions intensity, from 0.20 tCO₂e/MWh in 2021 to 0.09 tCO₂e/MWh in 2022

Source: Elaborated by the author.

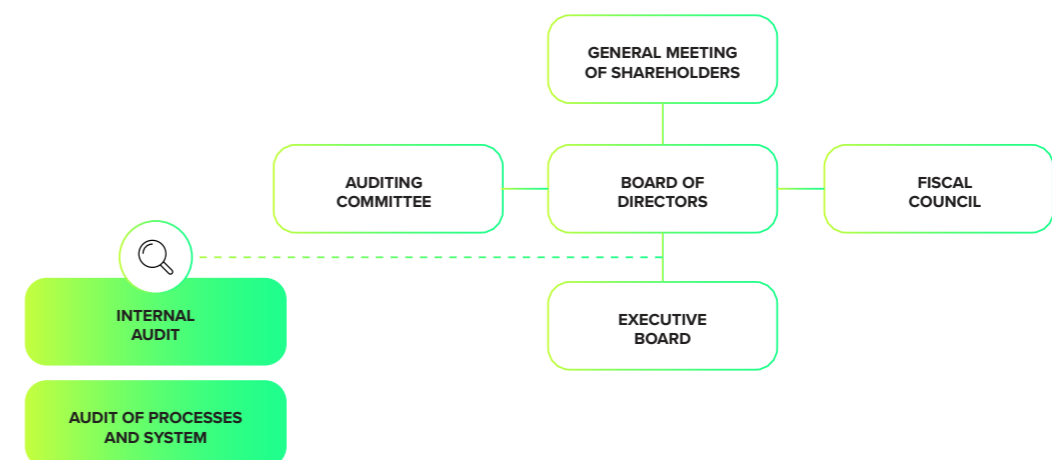
04. DISCLOSURE

4.1 | GOVERNANCE



Cemig's corporate governance is based on transparency, fairness, and accountability. The Company's Senior Management is exercised by the Board of Directors and the Executive Board and has a permanent Fiscal Council. The members of the Board of Directors, elected by the General Meeting of Shareholders, elect their Chief Executive Officer, and appoint the Executive Board. The governance structure is shown in Figure 4. All are governed by the Company's Bylaws and applicable legislation.

Figure 4. Cemig's corporate governance structure.



Source: Cemig Annual and Sustainability Report 2022.



Reporting directly to the Chairman is the Deputy Director of Communication and Sustainability (CSO), responsible for the issue related to climate change. Its attributions involve 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 with the sectoral regulation.

Among the various attributions of the Board of Directors are, for example, 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 with the sectoral regulation. In order to fulfill these duties, the Board of Directors meets, ordinarily, in accordance with its Internal Regulations, at least once a month, to analyze the indicators and results of the Company and its wholly-owned subsidiaries, subsidiaries and affiliates, in addition to deliberating on the other matters included in the agenda and, extraordinarily, by convocation of its Chairman, or one third of its members or when requested by the Executive Board.

CEMIG'S CORPORATE GOVERNANCE IS BASED ON TRANSPARENCY, FAIRNESS, AND ACCOUNTABILITY.

To monitor ESG actions, including climate change, the Sustainability Management presents to the Audit Committee the progress of the main actions, as well as the reporting of indicators. The Audit Committee is the auxiliary

collegiate body of the Board of Directors, with regard to the exercise of its audit and inspection functions over the quality and integrity of the financial statements, adherence to legal, statutory and regulatory standards, and effectiveness of internal control systems and internal and independent audits.

The Audit Committee is composed of 4 (four) members, all independent, appointed and elected by the Board of Directors, and one of the members of this Committee is also a member of the Board of Directors

4.1.1 | Board Supervision

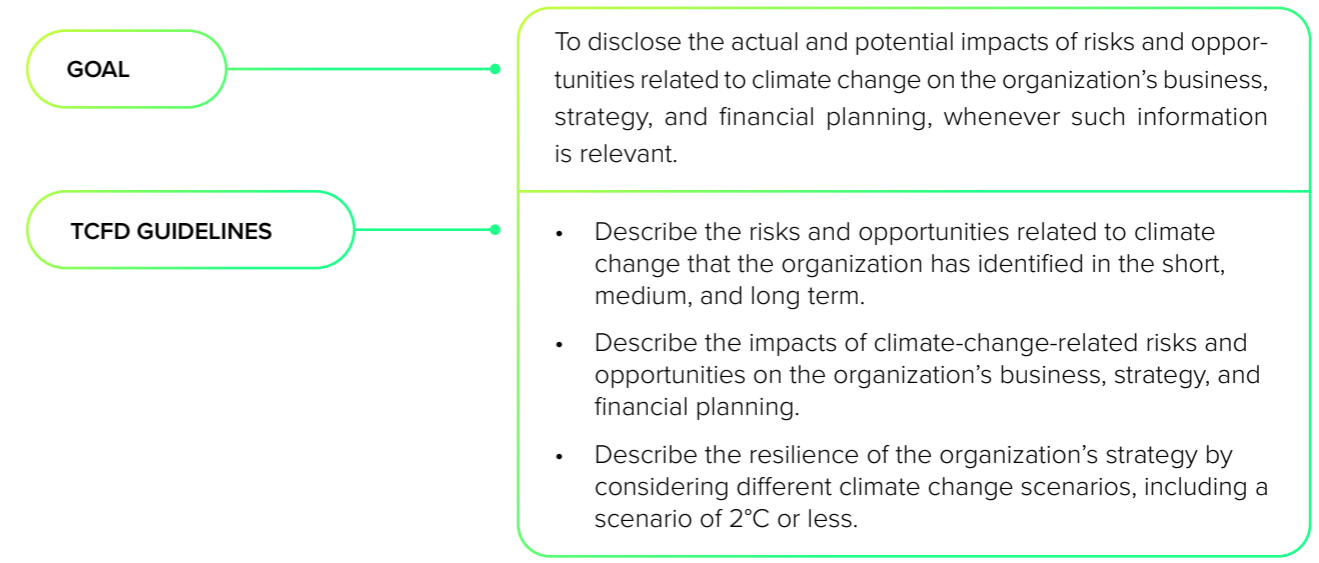
The position of highest direct responsibility for the issue of climate change at Cemig is the position of Deputy Director of Corporate Communication and Sustainability (CSO), which supports the management of processes reporting directly to the Presidency of Cemig, which represents the highest level of the Executive Board, and which, in turn, reports directly to the Board of Directors. On a monthly basis, the CSO presents to the Chief Executive Officer and the Board of Directors the progress of the main ESG actions within the Company.

In addition, whenever the approval of any deliberative issue is necessary, an evaluation is made by the Executive Board and forwarded to the level of the Board of Directors. In 2022, for example, topics such as the definition of the growth strategy in generation focused on renewable sources, the adherence to the Net Zero Ambition Movement of the United Nations (UN) Global Compact, and the construction of photovoltaic plants were the subject of analysis and approval by the Board and Administration.

According to the Internal Regulations, the role of the Board of Directors is to supervise and control the Company's activities, exercising

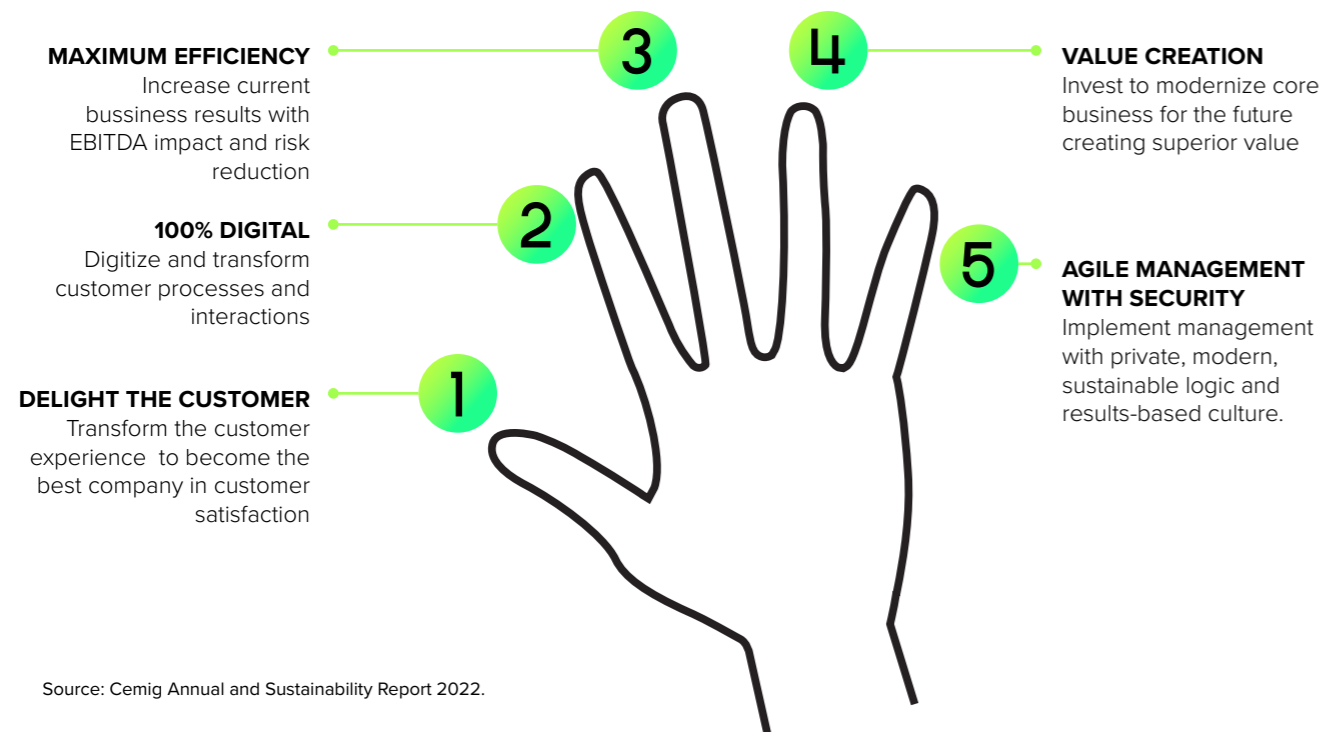
concrete responsibilities in relation to the strategy and direction of the business, and entrusting the ordinary management of the business to the executive bodies. The management of climate issues falls within these functions to the extent that the climate-related risks and opportunities that are mapped out by the Company influence the strategy and financial planning – especially when Cemig mobilizes to establish and achieve decarbonization goals in the short, medium, and long term. It is by understanding the importance of a well-equipped and informed Board of Directors that Cemig has members specialized in the electric energy sector, in regulatory issues of relevance to the Company, and academically and professionally experienced in the subject of Corporate Governance.

4.2 | STRATEGY



Cemig's strategic planning was updated in December 2022, covering the period between 2023 and 2027. With the motto "Focus and Win", the strategic plan has the ambition to focus on Cemig D and GT, leading in customer satisfaction and safety and achieving regulatory levels of efficiency, through a management with private, modern, and sustainable logic. The plan aims to accelerate the transformation from five pillars, shown in Figure 5.

Figure 5. Five pillars of Cemig's strategy.



Source: Cemig Annual and Sustainability Report 2022.

Cemig has been seeking, in these pillars, to develop the necessary resilience to face climate issues by anticipating the trends that have been transforming the sector, such as the energy transition with expansion of the energy matrix based mainly on solar and wind energy; the technological revolution, with storage and digitization solutions; the new business models, such as the growth of distributed solar generation and electrification of the vehicle fleet; the reinvention of traditional utilities, which must empower their customers; and the evolution of regulation, which is expected to advance more and more towards hourly prices.

To **delight customers**, Cemig plans to serve better, maximizing profitability and satisfaction through more efficient service, fewer errors, and fewer complaints. Transformations in the relationship with the

consumer are linked to renewable distributed generation, distributed storage, conventional distributed cogeneration, automation of grid interventions, advanced measurement infrastructure and demand management.

With the aim of being **100% digital**, Cemig seeks to operate in a more efficient, resilient and modern way, in a redesign of its operating model with leverage of data and digital solutions, whether in energy supply, corporate management, expert systems and services and customer relationships.


In order to ensure **maximum efficiency**, Cemig has been working to increase network performance, reducing operating costs and increasing revenue through automated measurements (reduction of delinquency and losses) and reduction of interruptions in supply, either through battery banks or automated reconnections.

Looking to accelerate **value creation**, Cemig must implement a series of reinforcements and improvements in the current network, in addition to the modernization of the generation plants. Cemig should also invest in intelligent platforms and increase its analytical capacity. Gasmig's expansion projects

and a series of actions for innovation are also planned, which will be detailed later.

Aiming for an **agile and secure management**, Cemig will invest in changes to its operating model and ESG practices. In the environmental axis, it should prioritize and work with the theme in an integrated way, articulating and communicating its commitments and goals, in addition to always focusing on investments in clean energy. In the social sphere, it should meet the interests of society, ensuring high levels of security and combating occupation under lines. In the governance axis, it should define criteria for evaluating leadership, promote diversity and strengthen data protection practices.

By assuming these commitments, the company ensures the continuity of its strategic actions, which in the period between 2019 and 2022 had as results:




RESULTS 2019 – 2022

- The recovery of cash of R\$ 6.5 billion from a series of divestments;
- Investments in Minas Gerais in Distribution (maintenance and modernization of the electrical system); Generation (expansion and modernization of the generator park); Transmission (reinforcements and improvements); at Gasmig (infrastructure); and Cemig SIM (infrastructure) totaling R\$ 2.76 billion, 7x higher than what was invested between 2009 and 2018 in the state;
- Of the 22.5 billion that would be invested in the coming years, R\$ 18.2 billion have already been contracted and R\$ 5.7 billion have already been made with structuring investments such as the Photovoltaic Plant (UFV) of Boa Esperança and Três Marias Jusante, which together add up to an added power of 274 MWp and should be operated between 2025 and 2026; and the Substations (SE) of Barreiro I, Jacutinga, Alfenas, Araguari, Bocaiúva, Lagoa Grande, Machado Mineiro, Minas Novas, Martinho Campos, Nova Lima, Nova Serana, Varjão de Minas and Paracatu; among other actions;
- The operational efficiency of the generation plants has increased, and the availability of Cemig's assets exceeds the industry average with a consistent increase in recent years;
- The company's market value reached R\$ 28.2 billion, with a 180% appreciation since September 2018;
- Credit quality rating agency recognition (AAA+);
- Operating expenses within the regulatory limit and energy losses below the regulatory limit in the last 2 years.

In the period from 2023 to 2027, investments of around R\$ 42.1 billion are planned, which will be used to convert customers into the Three-Phase Mines Program, a program that will transform thousands of kilometers of rural power grids that are now single-phase into three-phases, ensuring greater quantity and quality of energy for the population living in the countryside; the construction of more than 3,500 km of transmission lines, the

installation of 1.25 million smart meters, the development of 136 new substations, the increase in distributed generation, the reduction of the number of hours without energy supply, the commercialization of energy to end customers (free market), among other actions.

Also in relation to the Strategic Plan, Cemig reaffirms once again its commitment to sustainability through environmental conservation practices, social responsibility and corporate governance. Among the ESG actions, stand out in the company's trajectory:

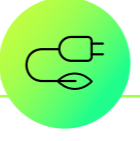


ESG HIGHLIGHTS

- Brazilian company with the best ranking in the Carbon Clean200™, a ranking that lists the 200 publicly traded companies that lead energy transition initiatives;
- Conservation and reforestation, and planting of more than 1 million seedlings planned for the next 5 years and maintenance of 1,200 hectares of green area;
- More than 1.18 thousand families benefited from the Social Tariff Program, which consists of granting a direct discount on the electricity bill of low-income families;
- Ongoing efforts to regularize, by 2027, 240,000 families through the Legal Energy Program, reducing commercial losses, ensuring improvement in the quality of supply and avoiding risks to the population;
- Forecast of installation of more than 120 thousand points of public lighting by LED;
- Monitoring the learning of young people through courses, with 50% of the vacancies destined to women and vacancies for children of people who have already been in street situation;
- Strengthening the Diversity Policy through the principles of empathy, respect, appreciation, non-discrimination and equity;
- Incentive to cultural projects, with more than 147 projects served in 108 municipalities, in an investment of R\$ 68 million reais in 2022 alone;
- Aberje Award for the recognition of Cemig's communication actions with its clients;
- Recognition of compliance with international norms and standards through the Certification issued by the Institute of Internal Audit (IIA);
- Recognition of Cemig's Renewable Energy Certificate (Cemig-REC) by Bureau Veritas, ensuring that information is traceable and secure.


In relation to ESG commitments, the company is attentive to the demands of the market, employees, customers and society, and will continue in the coming years to: develop environmental practices in line with the Sustainable Development Goals (SDG); contribute to the social development of the state of Minas Gerais through the provision of services in the energy segment and health and safety care (employees, customers and community); and define and implement an agile and transparent governance logic, creating a culture engaged with results and meritocracy. Figure 6 below shows Cemig's strategic commitments according to its strategic planning.

Figure 6. Cemig's ESG commitments according to the Strategic Plan.




ENVIRONMENTAL PRACTICES

- Fulfill the actions to achieve the ambition to be Net zero by 2040, with the commitment to reduce 75% of total greenhouse gas emissions by 2030
- Develop business in line with the UN Sustainable Development Goals (SDGs)
- Focus on clean energy source (or fully offset impacts)
- Expand the sale of Renewable Energy Certificates - Cemig REC and I-REC
- Develop biodiversity conservation actions in order to generate benefits for society
- Develop actions aligned with the circular economy, expanding recycling, equipment repair and waste management



CONTRIBUTIONS TO SOCIAL INTERESTS

- Articulate communication with Minas Gerais society and public authorities (including municipal)
- Act as an inducer of state development, eliminating bottlenecks and waiting for new connections
- Promote actions to combat human occupation under lines and irregular power connections
- Promote projects aimed at social and cultural development in schools, hospitals, city halls and other social entities
- Make investments that generate jobs and contribute to the development of local communities in Minas Gerais



CORPORATE GOVERNANCE PRINCIPLES

- Continuously improve Cemig's positioning within largest global sustainability rankings
- Promote diversity within Company, by raising awareness of the topic, inclusion action and goals
- Strengthen the culture of compliance and integrity that contributes, in a simple and sustainable way, to delivering the Company's result
- Manage risks, aiming to ensure the success of strategic objectives and minimize the associated negative impacts
- Act in such a way as to promote Transparency and ensure the protection of information and personal data under Cemig's responsibility

Source: New Cemig Strategic Planning, 2023

The consistent advances over the years demonstrate that the commitments made by Cemig have been transforming the company. Several opportunities are being assessed, also in response to the need for decarbonization and adaptation to climate change. In addition to the generation technologies that are already consolidated, Cemig is attentive to integrated energy solutions (hybridization and association)², capacity market³, green hydrogen⁴, and offshore wind farms⁵.

Among Cemig’s strategies for the coming years, we highlight the improvement of practices to monitor and manage risks, including those related to climate change, giving more transparency to the organization. The following are the risks and opportunities related to climate change that Cemig has identified in the short, medium, and long term, as well as the impacts on the organization’s business, strategy and financial planning.

4.2.1 | Climate-related risks and opportunities

In 2022, Cemig internally mapped a total of 40 priority risks, 30 of them operational and the other 10 compliance. For an efficient management of these risks, involving the prioritization of mitigation and adaptation actions, the Company evaluates the potential impacts and horizons of materialization according to the periods identified in the Bylaws, which are presented in Table 2.

Table 2. Time horizons

SHORT TERM	<p>UP TO 1 YEAR</p> <p>The annual review of the Budget by the Executive Board is foreseen. This revision is reflected in all plans, projections, activities, strategies, investments and expenses of the Company and its wholly owned subsidiaries, subsidiaries, affiliates, and consortia in which it participates, directly or indirectly.</p>
MEDIUM TERM	<p>BETWEEN 1 AND 5 YEARS</p> <p>The Company’s Multi-Year Business Plan must reflect the premises of the Long-Term Strategy and contain the five-year (5) year goals, including the Annual Budget. The Multiannual Business Plan is reflected in all guidelines and plans of the Company and its wholly owned subsidiaries, subsidiaries, affiliates, and consortia in which it participates, directly or indirectly. The Plan addresses in detail, among others: (i) the Company’s strategies; (ii) new investments and business opportunities; (iii) the amounts to be invested; and (iv) the rates of return and profits to be obtained or generated by the Company.</p>
LONG TERM	<p>BETWEEN 5 AND 10 YEARS</p> <p>The Long-Term Strategy contains fundamentals, goals, objectives, and results to be pursued and achieved in the long term by the Company. The Long-Term Strategy is reflected in all plans, projections, activities, strategies, investments and expenses of the Company and its wholly owned subsidiaries, affiliates, and consortia in which it participates, directly or indirectly. The Long-Term Strategy contains the Company’s strategic fundamentals (Mission, Vision, and Values) as well as the long-term strategic guidelines.</p>

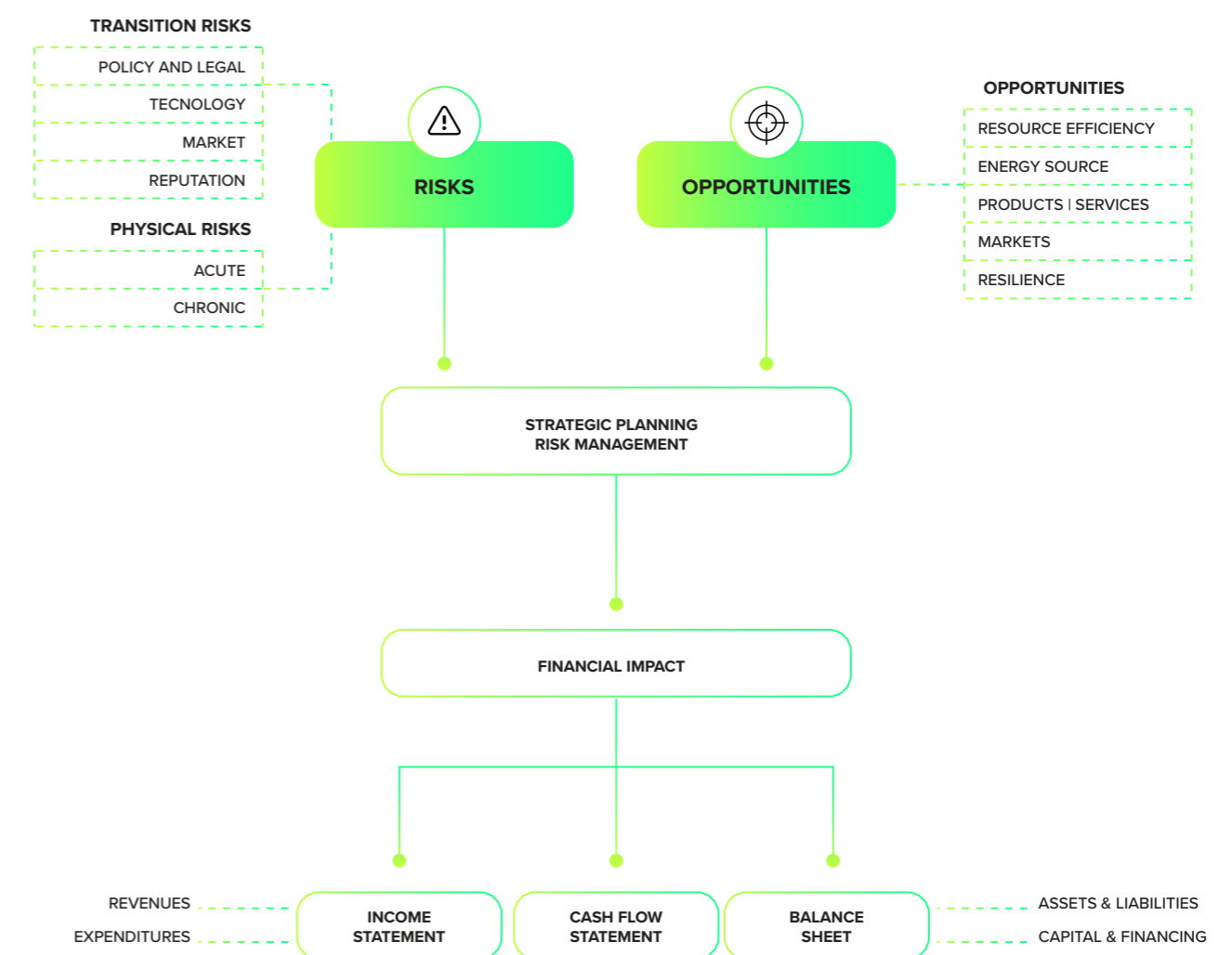
Source: Cemig’s Bylaws

2- Cemig has been studying the development of photovoltaic plants associated with hydroelectric plants.
 3- Cemig has been evaluating the insertion of generating units in some plants, developing thermal projects for capacity reserve auctions, studies for the design of reversible plants and ways to maximize the valuation of reservoirs.
 4- Cemig signed a memorandum of understanding with UNIFEI for research and development projects in green hydrogen.
 5- Environmental studies were initiated for the implementation of 2 wind farms on the coast of Ceará, with a combined total power of 4.5 GW.

To assess possible impacts of climate change, Cemig carried out the mapping considering the horizons for physical and transition risks, as well as for opportunities, according to the categories listed by the Task Force (Figure 7), in a process that involved the Board of Directors, the Risk Committees and the respective areas exposed to the risks identified.

This process of identification, evaluation and response to risks considers the level of criticality of the same based on the probability of occurrence and the expected financial impact, enabling the construction of a matrix that allows prioritizing and addressing pressing issues with agility. All this due diligence is important for proper threat management, directing monitoring and response initiatives.

Figure 7. Climate change-related and potential financial risks and opportunities



Source: TCFD, 2017

4.2.1.1 | Transition Risks

Transition risks are related to the possible evolution of economic or market, political and legal, technological, and reputational elements in a time frame (Figure 8). That is, from a series of scenarios, it is possible to evaluate the possibilities of evolution of each of these elements, evaluating what would be the associated risks and opportunities and the financial impact that they would bring to the company.

Figure 8. Examples of transition risks



Source: Adapted from TCFD

As there will be a need for change in a number of economic, legal and technological aspects so that the world can go through the energy transition, necessary for the reduction of GHG emissions, there are several possible routes that must be evaluated. Cemig sought to assess the risks based on two scenarios of the International Energy Agency (IEA):



- Sustainable Development Scenario (SDS): potential path to meet the goals of the Paris Agreement through assumptions about policies aimed at increasing energy efficiency and increasing energy production from renewable energy sources. In this scenario, it is expected that there will be demand for new products and services, as well as investments in new technologies such as smart grids, distributed generation, energy storage, among others;
- Net Zero Emissions Scenario by 2050 (NZE): scenario that sets a path for the global energy sector to reach net-zero CO₂ emissions by 2050, that is, it does not depend on emission reductions from outside the energy sector to achieve its goals. It is a scenario consistent with a limit increase in the average global temperature by 1.5 °C. In this scenario, it is expected that the Brazilian NDC will be fulfilled, that is, that Brazil will decarbonize by 2050.

POLITICAL AND LEGAL RISK

Considered a **Top Risk** for Cemig, regulatory changes in terms of climate change are constantly monitored by the Company. This risk is in line with the National Policy on Climate Change, in which the Brazilian government made its contribution to the Paris agreement official, 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 of reducing GHG emissions by 43% below 2005 levels, in 2030 and reach carbon neutrality by 2050.

Corroborating this scenario, currently 100% of Cemig's installed capacity comes from renewable sources, predominantly hydroelectric, and the company's strategic plan is the continuous expansion based on a clean and diversified energy matrix. The company has medium and long-term guidelines – until 2040 – to expand solar and wind generation capacity. In order to align these strategies and operations with the principles of corporate social responsibility and sustainability, Cemig participates in initiatives such as the Climate Action Platform of the Brazil Network of the UN Global Compact.

In terms of emerging regulation, the issue is relevant mainly because of the government's commitment established through the NDC. At this governmental level, the issue of carbon taxation has been gaining momentum. The discussions are followed by Cemig, especially because of the potential taxation of its Scope 2 emissions from energy losses.



POLITICAL AND LEGAL RISK

Considering the Deep Decarbonization Scenario (DDS), made available by the Institute for Sustainable Development and International Relations of France (IDDRI) and used in the ACT-DDP project, the⁶ intensity of emissions in 2040 in Brazil should not exceed 0.0014 tCO₂e/MWh in 2040, that is, considering CEMIG's generation in 2021, of 15,490,337.90 MWh, emissions would be limited to 21,686.47 tCO₂e (value adopted as ceiling or **cap** of emissions). In 2022, the company's total emissions were 5,296,976.92 tCO₂e (scope 1, 2 and 3), but Cemig's simulations estimate emissions reaching 1,015,446.10 tCO₂e in 2040 with the adoption of different mitigation actions. Thus, considering a price of 50 USD/tCO₂e, the value adopted by DDP, the cost of compensation could reach USD 50 million.

Cemig seeks to implement measures to mitigate this potential risk by defining emission reduction targets and establishing evaluation criteria for new acquisitions considering carbon risk in **due diligence operations**, immediately minimizing the probability and magnitude of the risk.

Cemig also seeks information aimed at adapting to this risk through participation in the Working Group on Climate Change and Air Quality, which is part of the Council of Entrepreneurs for the Environment (CEMA) of the Federation of Industries of the State of Minas Gerais (FIEMG), where discussions are held on possible changes in legislation resulting from the implementation of the National Policy on Climate Change.

At the same time, as Cemig seeks to achieve carbon neutrality by 2040, if a **cap-and-trade** trading market is established, the company could position itself as an important supplier of emission reduction certificates, generating revenues of around USD 1 million (considering the hypothesis of a previous ceiling and without considering an increase in generation). Taking advantage of the opportunities, the company has already been marketing Renewable Energy Certificates – Cemig REC and I-REC.

Legal risks, although not currently considered relevant to Cemig's business, are included in the scope of the corporate assessment of risks related to climate change, that is, the methodology developed by the Risk Management and Internal Controls Management maps together with the other managers any potential legal implications related to the Company's areas.


Although legal issues do not represent a material issue for Cemig, it is important to note that the company presents principles in its Environmental, Water and Biodiversity Policies that guide good practices in order to avoid any implications. Examples are the emphasis on compliance with current environmental legislation, the encouragement of the participation of society and communities affected or interested in all stages of the project, and the implementation of programs to improve the environment, where communities are located, and vulnerable areas.

6- ACT stands for **Assessing low-Carbon** Transition and DDP is the acronym for **Deep Decarbonization Pathways Initiative**. The ACT is the only methodological framework with sectoral methodologies that assess how companies' strategies and actions contribute to the Paris Agreement's GHG emissions reduction goal (below 2°C). DDP is a collaborative initiative between countries to develop analytical methodologies and build consistent trajectories at the national and sectoral level over the long term. The ACT uses the emission scenarios constructed by the DDP initiative to assess the path of decarbonization in different sectors.

TECHNOLOGICAL RISK

The accelerated technological advancement also fits into the risks included in Cemig's Top Risks, which considers the loss of market, customers and, consequently, reduction of revenue as the main potential impacts; however, Cemig has been investing in research and development and strategic partnerships, in addition to following the advances in terms of new technologies capable of increasing its efficiency in the provision of services.

Among the set of transformative changes already identified by Cemig are:

- 
1. the growing decentralization of power generation systems;
 2. the advancement of energy storage technologies;
 3. the proliferation of digital technologies (which allow energy to be produced, transmitted and consumed more intelligently and efficiently);
 4. growth of variable renewable energy sources, such as wind and solar;
 5. trend towards decarbonization of the energy system as part of global efforts to mitigate climate change.

Cemig avoids the materialization of this risk by investing in innovation, always aiming to continuously improve its processes, and consequently, reducing its greenhouse gas emissions and adapting to the effects of climate change by seeking to diversify the energy matrix.

As part of its medium to long-term strategic planning, the company defined the initiative to explore new technologies, and opportunities, such as the **smart grid**, hybrid generation, energy storage, digitalization, among other actions already mentioned, in order to mitigate this risk and leverage the opportunities. As a way to make this strategic initiative viable, Cemig annually launches R&D calls for proposals focused on the opportunities mapped.

According to the Strategic Plan, the company should invest R\$ 1 billion in innovation by 2032, in storage initiatives, demand management, energy efficiency, electric mobility, advanced analytics, process automation, blockchain, among others.

By developing its business for the future, the company has been managing risks in an increasingly active and informed way, transforming them into opportunities for leadership in the market and, for this very reason, today Cemig is one of the main companies in the energy sector in Brazil.

MARKET RISK

Over the last few years, Cemig has lost market value and share, moving from 2nd to 6th position in the ranking of Brazilian companies between 2009 and 2020. There was evident difficulty in paying attention to the various businesses, but since 2020 the company has repositioned itself, taking advantage of market trends. The investments and strategies focused on customer service through new technologies and innovation, in addition to ESG actions, have allowed an accelerated recovery of the company.

In a scenario of greater corporate investments in energy efficiency aimed at reducing energy consumption and, consequently, GHG emissions, the Cemig SIM subsidiary will possibly have an increase in demand for its services, including the implementation of projects for the use of lighting with LED technology, cogeneration, distributed generation, and other energy solution services. 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 the 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.

It is noteworthy that these projects are carried out through performance agreements where Cemig SIM contributes with the necessary resources and recovers its investment through the economy of these projects. In this context, Cemig SIM may also have an increase in the demand for consulting services for the implementation of an Energy Management System based on ISO 50001.

REPUTATIONAL RISK

Cemig evaluates the image and reputation impact for all its strategic risks prioritized by the Board of Directors, the so-called **Top Risks**. Specifically regarding the image and reputation dimension, the impact of the risks can be classified into six levels, ranging from Very Low – consisting of possible exposure among employees of the sector, but reversible through actions to be taken by the process manager – to the Critical level – characterized by the compromise of the image at an international level, before regulatory bodies, financial institutions, clients, society, opinion makers, market and media.

In this scenario, the possibility that Cemig may need to expand its energy supply through fossil-fuel-powered thermal power plants stands out if its renewable energy supply does not meet demand. The resumption of a non-renewable source of energy would be detrimental to the company's image, which would impact the value of the brand. The materialization of this risk could result in a worsening of Cemig's sustainability indicators, reflected in the reduction of the company's score in questionnaires such as the ISE (B3 Corporate Sustainability Index) and the DJSI (Dow Jones Sustainability Index). In an extreme case, this risk could lead to Cemig's non-inclusion in the portfolios of these sustainability indices each year, resulting in a fall in the market value and deterioration of the company's reputation with investors.



In order to avoid this risk, Cemig invests in the enhancement of its hydroelectric plants and seeks to implement mitigation measures related to the energy matrix by diversifying renewable energy sources. The company has medium and long-term guidelines (until 2040) to expand solar, wind and natural gas thermal generation capacity.

4.2.1.2 | Physical Risks

Physical risks are related to the effects of climate change, which stem from the change in the frequency and intensity of weather events. These risks are divided into acute and chronic, with acute risks triggered by extreme weather events (e.g., a storm causing flooding over a city), and chronic risks related to impacts from progressive changes in climate (e.g., increased droughts due to changes in rainfall regimes) (Figure 9).

Figure 9. Exemples of physical risks



Source : Adapted from TCFD



For the assessment of physical risks, we used the scenarios made available in the sixth phase of the Coupled Model Intercomparison Project (CMIP6), a collaborative structure designed to improve knowledge about climate change and organized since 1995 by the Working Group on Coupled Modelling (WGCM) of the World Climate Research Programme (WCRP).

The impacts were assessed for the 2050 time horizon and took into account the Representative Concentration Pathways (CPR) presented in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The scenarios evaluated by Cemig were:



RCP2.6

Represents the scenarios in which the increase in global average temperature would be below 2°C, being extremely strict regarding greenhouse gas emissions. This scenario is unlikely in the short term;

RCP3.4

Represents an intermediate emissions scenario between 2.6 and 4.5, but still includes a considerable removal of greenhouse gases from the atmosphere. This scenario is still unlikely, but less so than 2.6;

RCP4.5

Represents an increase in concentrations, with an estimated peak around 2040 and then a decline until it reaches a value of approximately half of that recorded around 2050, by 2100;

RCP7.0

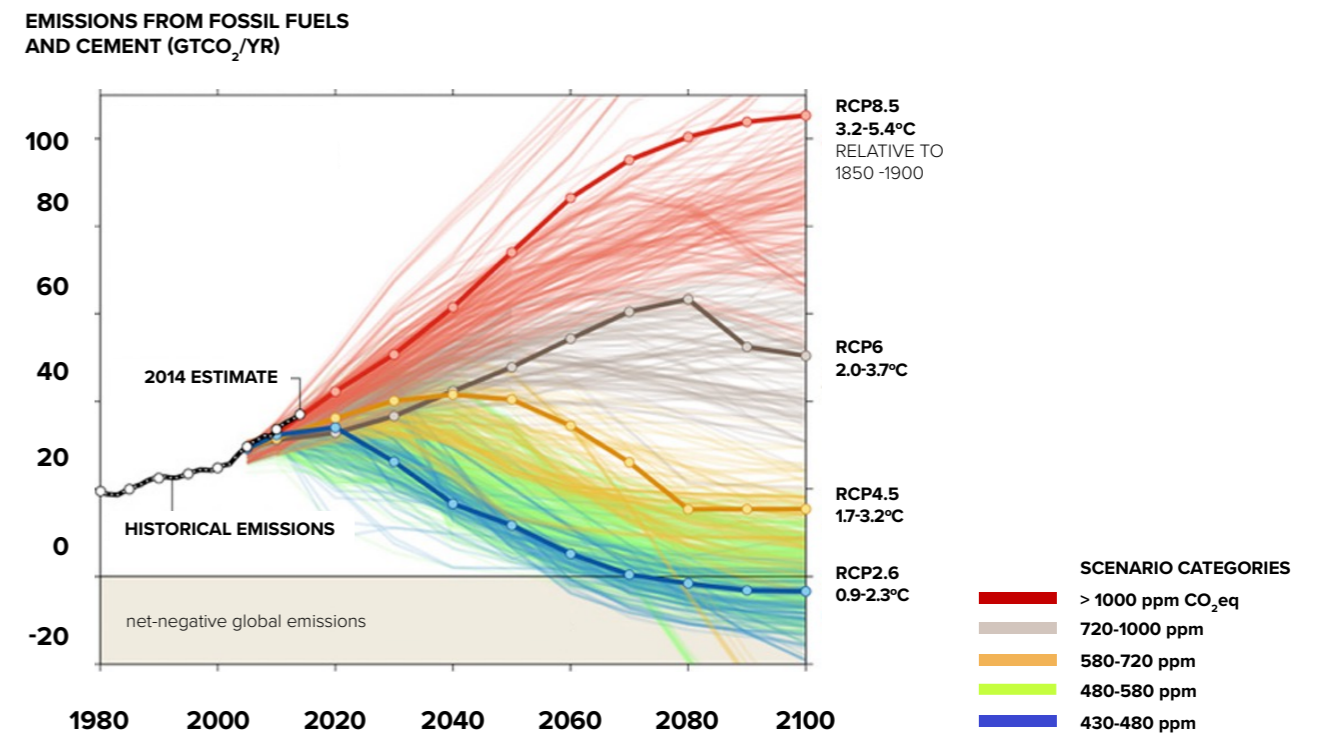
Represents the scenarios of stabilization of the radioactive forcing at 6 W/m2. It represents a less likely scenario than the previous one.

RCP8.5

Represents the scenarios with high greenhouse gas emissions, very useful for analyses up to mid-century, but is highly unlikely beyond it if climate policies are implemented by countries.

Figure 10 highlights greenhouse gas emissions from 1980 to 2014 and the emission scenarios that have just been described. It should be noted that estimates up to 2014 seem to follow the path of high emissions.

Figure 10. Global emissions pathways



Source: Fuss et al., 2014

To evaluate the climatic indicators of precipitation, temperature, humidity, wind speed and cloudiness, the company opted for the use of a multi-model approach. This approach gives greater credibility to the results, as it allows to reduce the uncertainties that the use of only one model would bring.

The analysis carried out by Cemig's team made it possible to identify the climate risk for each of the company's plants and for others in which Cemig may have an interest.

THIS APPROACH GIVES GREATER CREDIBILITY TO THE RESULTS

Considering the analysis of the scenarios described above, with identification of physical risks, a quantitative and qualitative analysis of their impacts on the company's operations, as well as their impact on the business, was performed. The results of these analyses will be discussed later in the Scenario Analysis section.

CHRONIC RISK

Chronic physical risks are also a relevant topic included in Cemig's **Top Risks**. Among the climatic phenomena that fall into this class, two stand out for the company:

- **Water scarcity:** climate change can cause extreme rainfall and drought events, as well as changes in the geographical distribution of these phenomena. In addition, there may be a change in the average precipitation values, modifying the amount of water that reaches the reservoirs of the plants. As Cemig's production of electricity is mostly hydraulic, these changes may cause a reduction in generation capacity. The actions taken to mitigate this risk are linked to the expansion of Cemig's operations in other regions of the country, and investments in diversification of the generation matrix, seeking solutions in other energy sources, such as solar and wind.
- **Fires:** the increase in average temperatures and changes in rainfall and drought regimes can potentiate some risks to the Power Transmission System, as prolonged drought conditions maximize the risk of fires. Within or near the easement strips, fires can cause occurrences of unavailability of transmission lines. To mitigate this risk, Cemig continuously performs inspections and cleanings on the tracks to maximize the safety and availability of transmission functions. A new system for monitoring, forecasting and warning of fires was also implemented, in order to subsidize the various areas of Cemig to minimize the risks of shutdown. The company developed, through the collaboration of a network of institutions, the Project Put Out the Fire (AoF, in the acronym in Portuguese). It is a system that makes available, in real time, images that are processed through artificial intelligence algorithms that, autonomously and with the help of Internet users, can assist in the identification and early validation of the smoke foci of the evolution of the fire.
- **Another way to mitigate this risk is through investments in the Research and Development area,** in projects such as the Distribution Operation Center of the future, which is a platform that facilitates the understanding of the operating scenario and decision making, and the System Operation Center that aims to train and mobilize teams for interventions in extreme weather events.

ACUTE RISK

Damage to infrastructure is considered priority risks given that the occurrence of heavy rains in a short period, accompanied by gales and lightning, can cause physical damage to the facilities that transport and distribute energy, leading to service interruption. In addition to being an issue that affects Cemig's relationship with its consumers, these interruptions in the energy supply also result in an increase in Cemig's costs, since it is foreseen to reimburse consumers in these cases. With the increase in the frequency of severe weather events associated with the effects of an unfavorable microclimate, typical of large urban centers, physical risks represent a material issue for

Cemig and are therefore managed as **Top Risk** by the company.

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 afforestation (through pruning), the operation of climatological stations and meteorological radar, which more accurately predicts the

occurrence and intensity of storms, and the emergency plan with allocation of maintenance teams for the rapid restoration of energy supply.

Cemig also promotes works in its distribution system (expansion, reinforcement, renovation and renovation of assets such as substations and distribution lines) in order to reduce the occurrence of physical risks. For the five-year cycle of investments, which comprised the

period from 2018 to 2022 according to the regulation of the sector, investments were made above R\$ 6.4 billion, distributed among the different macroprojects. In 2022, the Company made investments in an amount of approximately R\$ 1.48 billion.

4.2.2 | Impact of climate-related risks and opportunities

Cemig considers the influence of climate issues in the strategic and financial spheres in all its business fronts, which enables the anticipation of relevant issues and a more adequate response time, as well as stimulates the identification of opportunities. Next, we highlight the business areas and the respective impact assessment on these fronts.

4.2.2.1 | Strategic planning

PRODUCTS AND SERVICES

With a predominantly hydraulic production of electricity, Cemig recognizes that the risks inherent to climate change can cause a reduction in generation capacity and a significant impact on energy supply. In this way, Cemig, among other risks, acts preventively, monitoring:

- **Change in the precipitation pattern:** Cemig has a specific organizational structure that supports risk management and decision-making, both in the marketing and operation of assets. Cemig also participates in the Energy Reallocation Mechanism (ERM), whose purpose is to share the hydrological risks of plants in situations of high inflows and generations, which transfer energy to plants in situations of low inflows and generations.
- **Tree falls during storms:** Cemig continuously carries out inspections and cleanings in the easement strips of its distribution lines to maximize the safety and availability of transmission and distribution functions (always limited to the minimum removal of vegetation, avoiding cutting in places where there is no interference with the transmission and distribution lines).
- **Precipitation regimes and intense storms:** Management methods seek to reduce, in the medium term, the magnitude of this risk through preventive adaptation measures, such as the proper management of urban afforestation through pruning, the operation of climatological stations and weather radar, which more accurately predicts the occurrence and intensity of storms, and the emergency plan with allocation of maintenance teams for the rapid restoration of power supply.
- **Change in consumer behavior:** This risk is managed by performing the diagnosis of the electrical system for the need for expansion works; monitoring of operating conditions; and the reprioritization of construction interventions.

In addition to monitoring, Cemig has also invested in the diversification of its energy matrix, expanding the use of wind and solar sources in order to reduce dependence on hydroelectric plants. The current CAPEX plan (2023-2027) foresees an investment of about R\$ 35 billion in new projects, distributed between wind and solar power generation, as well as in repowering and maintenance of hydroelectric plants, in addition to an investment of R\$ 3.2 billion in Cemig SIM with a view to completing 50 solar farms.

VALUE CHAIN

There is a possibility of financial losses resulting from the increase in the intensity of winds, rains and periods of drought, which may indirectly affect the operation of Cemig's business. These impacts can occur throughout the supply chain, especially those directly involved in the deployment and/or maintenance of infrastructure (transmission and distribution).

In this way, Cemig constantly monitors its supply chain, maintaining a high level of standards and attention based on the mapping of potential risks and probabilities of occurrence, and tangible and intangible impacts, calculated in financial values, and of a strategic nature for the company.

In addition, Cemig seeks to align suppliers and contractors with its vision of sustainability, its commitments and corporate values. Among these corporate values, Cemig integrates in its Supply Policy the Commitment to Climate Change.

Cemig estimates that this impact on the value chain may occur in a medium-term horizon, and that the magnitude of the impact will be low, since the company has a supplier classification system based on social and environmental criteria.

A strategic decision of Cemig influenced by the climate issue is the application of a socio-environmental questionnaire to suppliers (initiated in 2019). The questionnaire, called Industrial Technical Evaluation, must be answered both by new suppliers and by those already hired by Cemig, as a form of periodic evaluation. In the content there are several issues, including some related to the environment (monitoring of GHG emissions and GHG reduction targets). In addition, a climate change primer was made available on the supplier portal in the year 2021.



Photo by Nicholas Doherty on Unsplash

INVESTMENT IN INNOVATION

Cemig seeks to implement mitigation and adaptation measures 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. In 2022, approximately R\$ 24 million was invested in all research and development initiatives.

The company defined the medium and long-term strategic initiative to explore new technologies and opportunities such as smart grid, hybrid generation, energy storage, “electroposts”, digitalization, among others, in order to mitigate this risk and leverage the opportunities. As a way to make this strategic initiative viable, Cemig annually launches R&D calls focusing on the opportunities mapped. Among the initiatives included in the Strategic Plan 2023-2027, the company should invest in storage, demand management, energy efficiency, electric mobility, advanced analytics, process automation, blockchain, among other actions such as:

- **Agrovoltaic system:** covers the research and development of alternatives for the exploitation of agrovoltaic systems in Minas Gerais. The proposal is to identify the products and opportunities that this new technology can generate, as well as the impacts on the production of photovoltaic energy integrated with agricultural production, aiming at a solution to the difficulty of associating the two activities in the same area.
- **H₂ Roadmap Project for Minas Gerais:** the product of this project will be a methodology to (i) evaluate the potential of technologies – traditional and emerging – related to the production and use of Green H₂ in the business environment of a target region, focusing on the potential of renewable energy production, the main productive sectors, the technical, operational and commercial impacts on the electricity sector, and the production of synthetic fuels (e-fuels) through carbon capture, and (ii) build a regional Strategic Technological Roadmap to direct actions that promote the supply and demand of Green H₂ through research and development programs, as well as public and private initiatives, contemplating the various economic sectors operating in the target region.
- **Modular System Production of Green Hydrogen (H₂V):** the product to be developed in this project consists of a modular plant for the generation and availability of hydrogen (H₂) via water electrolysis with application of H₂ in industrial processes, from rotary furnaces with burners adapted to a mixture composed of H₂ and other types of fuel gases. The product must be scalable, efficient, safe, and easy to integrate with existing industrial plants in order to allow the production and use of H₂V, according to the “appetite” of the plant.
- **Veredas Sol e Lares:** completed in early 2023, the floating photovoltaic solar plant in the Santa Marta SHP reservoir is associated with the construction of a methodology of social participation in the implementation, operation and maintenance of the plant and in the execution of R&D research, as well as the development of technologies for the use of natural resources for the economic development of a region aiming at reducing socio-environmental vulnerabilities and adapting to climate change. For the first time, a “shared” and floating power generation plant will be executed by the population to be benefited by energy credits and a technological solution will be discussed with the surrounding public as a socio-environmental solution for regional development. It will be a qualitative leap in R&D research, in order to ensure the social integration of technological

INVESTMENT IN INNOVATION

advances, demonstrating that research should be at the service of the quality of life of the Brazilian population and especially of the most vulnerable.

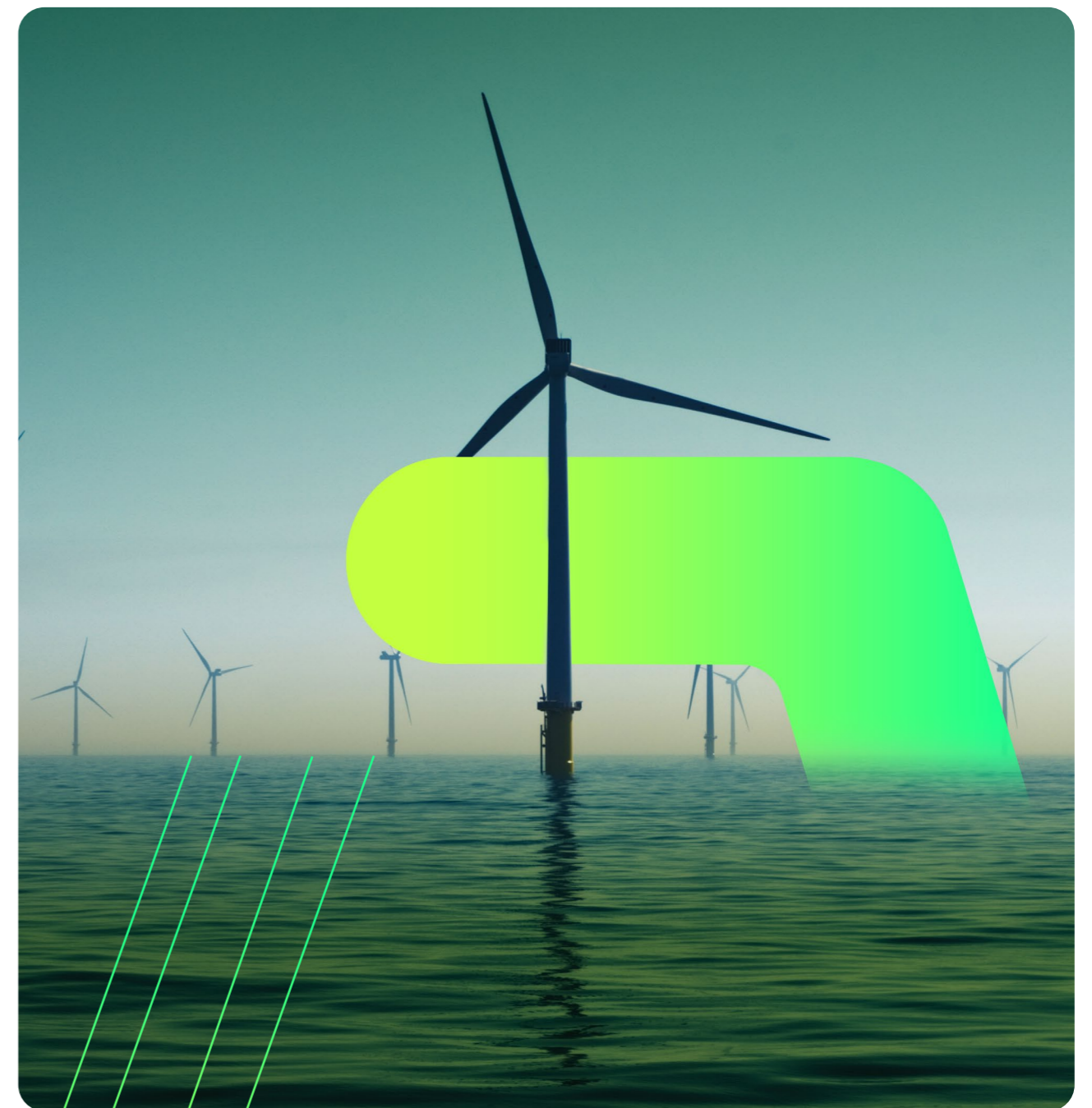
- **Reverse logistics system of batteries and photovoltaic panels:** In order to meet the high demand for solid waste production from photovoltaic systems and energy storage, the project presents the development of a reverse logistics system focused on batteries and photovoltaic (PV) panels. The proposed system includes the creation of a methodology for application in Cemig's reality, composed of methods of collection, recycling and reuse of equipment. The validation of the system will take place through a pilot project to meet rural electrification (irrigation) with an off-grid system with PV panels and reused batteries. In this stage will be applied the methods of collection (mapping of waste, collection, and transport logistics) and reuse (evaluation of the components that can be used). In the last phase, the results obtained become the basis for the modeling of the business model. At the end of the project, the main product to be applied at Cemig is the reverse logistics system.

OPERATIONS

Cemig promotes a series of initiatives that enable the accurate management of the possible impacts related to climate change on its operation, among them, the following stand out:

- **Hydrometeorological monitoring:** preventively, the Company invests in practices that position it in a situation of greater security in the face of the various possible scenarios, using modern techniques and equipment, such as the Storm Location System, Telemetry and Hydrometeorological Monitoring System, mathematical models of hydrological simulation and weather and climate forecasting.
- **Dam safety:** the process that aims to ensure the safety of dams operated and maintained by Cemig uses, in all its stages, a methodology supported by the best national and international practices, also complying with Federal Law 12,334/2010, which establishes the National Dam Safety Policy, and its associated regulation (Normative Resolution No. 696/2015 of the National Electric Energy Agency – Aneel). In this context, the procedures of field inspection, collection and analysis of instrumentation data, preparation and updating of dam safety plans, planning, and monitoring of maintenance services, analysis of results and classification of civil structures are contemplated. Based on the classification of the structures, the frequency of safety inspections and the monitoring routine are established. The vulnerability of each dam is automatically calculated continuously and monitored by the Dam Safety Specialist System (Inspector).
- **Distribution Development Plan (PDD):** the PDD consists of the realization of projects linked to the electrical power system, associated with the expansion, reinforcement, renovation, and renewal of Cemig D's assets, such as substations and distribution lines. For the 2023-2027 cycle, an investment of R\$ 3 billion is planned for the delivery of 136 new substations.

- **Diversification of energy generation sources:** Cemig GT, attentive to global trends in energy, in addition to investing in consolidated technologies – such as hydroelectric, photovoltaic and onshore wind – also includes in its new planning studies to enable the use of integrated solutions in energy (hybridization and association), capacity market, green hydrogen, and offshore wind.



4.2.2.2 | Financial planning

OPERATING COSTS AND REVENUES

Cemig’s electricity generation is predominantly hydraulic. In 2022, the Company had 76 Hydroelectric Plants (HPPs), Small Hydroelectric Plants (SHPs) and Hydroelectric Generating Plants (HGPs). Thus, a reduction in rainfall rates, which can be caused by climate change, affects the volume of water stored in the reservoirs, leading to a reduction in the capacity of energy generation. That is, the risks inherent in climate change can increase the exposure of generators in the short-term market, due to a significant reduction in energy supply, representing an impact of high magnitude.

Such a situation may directly affect the Company’s revenues, and even give rise to the possibility of lawsuits for any losses caused. The accidental interruption of transmission lines, due to extreme weather conditions, can cause a reduction in the availability of energy, with a direct impact on billing, as well as on distribution lines, causing interruption in the power supply. For this reason, Cemig invests in initiatives to strengthen the security and resilience of services, which implies additional costs for the Company.

On the other hand, the issue of water scarcity has been mobilizing Cemig to diversify its matrix through wind and photovoltaic generation, which may lead to increased power generation capacity from clean sources that are independent of the hydraulic component, potentially increasing the Company’s revenue.

INVESTMENTS AND CAPITAL ALLOCATION

Climate change determines the Company’s need to make additional investments to maintain and improve the distribution network. The Distribution Development Program (PDD) contributes to the mitigation of this risk, in addition to providing the answer to the increased demand resulting from the vegetative growth of the population. The company considers the magnitude of this impact to be medium.

Investment in improving the distribution network involves the implementation of new, more efficient technologies that also contribute to reducing greenhouse gas emissions indirectly by reducing technical losses and the number of trips to local interventions. Therefore, the PDD also supports the achievement of the Company’s climate goals. In addition, the current CAPEX plan (2023-2027) foresees an investment of more than R\$ 35 billion in the areas of Generation, Transmission and Distribution, with R\$ 2.8 billion invested in wind power generation and R\$ 7.7 billion in solar energy, in addition to an investment of R\$ 3.2 billion in Cemig SIM, a Cemig Group company focused on innovation, energy efficiency and energy solutions. These investments support the diversification of the matrix, an opportunity to reduce water dependence and ensure a renewable matrix with a low impact on the environment.

ACQUISITIONS OR DIVESTITURES

The uncertainty regarding the level of rainfall and, consequently, the reduction in the capacity to guarantee generation by Cemig’s hydroelectric plants, lead to the need to diversify the Company’s generating park and stimulate the construction and acquisition of wind or photovoltaic projects, technologies in which Cemig already has expertise.

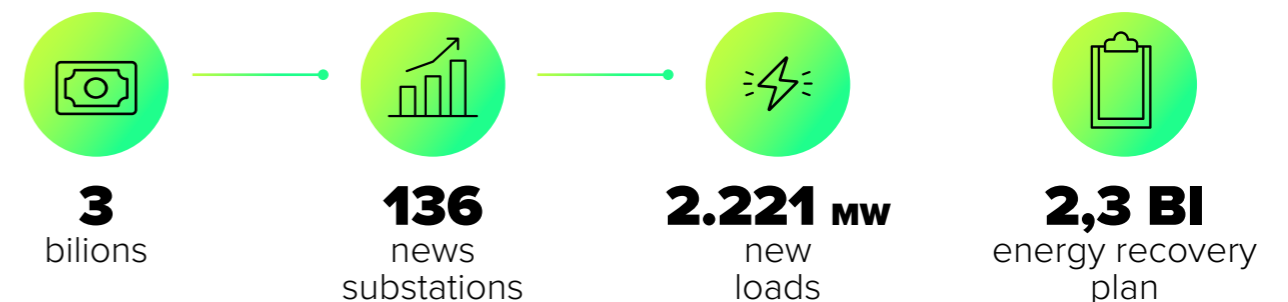
In addition, considering the reputational risks, Cemig is no longer expected to invest in thermal plants, having deactivated the only thermoelectric plant operated by the company in 2019. With this measure, the diversification of its matrix and investments in innovation in the area of generation and transmission go hand in hand with the decarbonization planning and the supply of 100% renewable matrix energy.

The company approved in 2018 the Multiannual Business Plan, reinforcing the commitment to the initiative of investment studies in wind and solar, aiming at the diversification of its generating park. Between 2019 and 2022, Cemig ended up carrying out a series of divestments, which generated a cash recovery of R\$ 6.5 billion.

In the new cycle of the Strategic Plan, Cemig foresees investments focused on the modernization of assets. In Cemig GT alone, investments between R\$ 500 and R\$ 600 million per year are planned for this purpose. In terms of expansion, Cemig GT foresees and sees opportunities in the continuity of the Transmission Auctions and has been working on the development of 100% renewable projects, including the three largest floating photovoltaic projects in the country.

WORKING ON THE DEVELOPMENT OF 100% RENEWABLE PROJECTS

The Company also foresees investments of R\$ 3 billion in 136 new substations, seeking to ensure the service of 2,221 MW of new loads. Another important focus for Cemig is the reduction of losses, whose investments amount to about R\$ 2.3 billion within the Energy Recovery Plan, which seeks to keep losses within regulatory parameters.



ACCESS TO CAPITAL

Cemig participates in several sustainability indexes and rankings, which contributes to communicating to the market the Company's sustainability practices, including its actions to mitigate the effects of climate change, and thus facilitate access to capital for investors and the financial market.

A factor considered critical in this scenario of access to capital is the issue of water scarcity, not only due to the potential impact on revenue, but also due to the consequent increase in GHG emissions if the Company must resume generation in a non-renewable matrix. Thus, Cemig's performance in the sustainability indexes and rankings of which it is part (DJSI, ISE, Oekom, CDP, Sustainalytics, among others) could be negatively influenced. In order to mitigate this risk, Cemig has increasingly invested in the diversification of the renewable matrix, reducing water dependence and building alternative renewable capacity in case water scarcity becomes a reality.

In terms of capital attraction, in 2022, Cemig GT obtained the independent verification of its Sustainable Finance Framework, an instrument that can be used for debt issuance for projects in the field of renewable energy. With the opinion, Cemig has the possibility to issue green bonds to raise funds in order to implement or refinance projects and assets that have positive attributes from an environmental point of view.

In the context of its operations, for the issuance of the bonds, Cemig considers – according to the opinion – renewable energy projects (including generation, transmission, equipment and products), being investments in reinforcements and improvements in electric power transmission facilities, increased power generation in existing Small Hydroelectric Plants (SHP) and improvements in the safety of existing hydroelectric plant operations. The impacts of the projects are obtained through indicators of total renewable energy and energy efficiency, in alignment with the relevant SDGs, socio-environmental benefits, other performance indicators, so that the Company's efforts are enhanced and reinforced in accordance with its sustainable strategy, feeding a positive cycle of investments and results.

**COMPANY'S EFFORTS
ARE ENHANCED
AND REINFORCED IN
ACCORDANCE WITH
ITS SUSTAINABLE
STRATEGY**



Photo by Markus Spiske on Unsplash

4.2.2.3 | Resilient strategy

Cemig highlights that, in 2023, it began the elaboration of its Transition Plan together with a consultancy specialized in the theme of climate change. The timing is opportune given that Cemig and its subsidiaries are mature to commit to more ambitious goals and coordinate a decarbonization process that includes all the Company's scopes and areas of activity.

As part of this maturation process, Cemig's trajectory highlights the creation, in 2010, of the Biodiversity Policy. In 2016, the Company approved the Water Resources Policy, the same year in which it updated its Environmental Policy, dated 1992.

In 2019, Cemig's Sustainability Plan was developed, in alignment with the Company's Strategic Planning and Top Risks, which are the risks of macro-processes that can directly impact the Company's strategy.

In 2020, goals related to several important themes for the Company were listed, including climate change and environmental performance. Some of the goals related to the theme of low carbon in 2020 were: tree planting; reduction of biomass affected by the Company's operations; stabilization, by 2022, of energy consumption at the level of the values consumed in 2017; recycling, regeneration or disposal of 99% of industrial waste; reduction of particulate matter emissions and 65% reduction of SF₆ losses based on the percentage of the actual loss of 2019, with a target year of 2027.

In 2021, Cemig prepared its Climate Change Adaptation Plan, a document that meets some of the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) on the process of disclosing the potential effects of climate change. In this Plan, scenario analysis was used to identify the potential implications on the company's business and operations in order to map the main physical and transition risks, as well as their impacts, proposing mitigation and adaptation measures.

As part of its climate trajectory, Cemig also participates in the

ACT-DDP project, which aims to raise the level of ambition for decarbonization of critical economic sectors, including the electricity sector. The alliance between the innovative methodologies ACT (Assessing Low Carbon Transition) and DDP (Deep Decarbonization Pathways) will allow to evaluate the company's decarbonization strategies in relation to national and sectoral routes consistent with the objectives of the Paris Agreement.



In 2022, Cemig launched its first edition of the TCFD Report, guided by the guidelines of the Task Force in order to provide greater transparency to key information and engage the Financial Board in climate discussions, in order to provide greater integration of the strategy on all fronts of the Company. In 2023, this second edition of the Report will bring Cemig's advances and greater alignment with the recommendations.

The elaboration of the Transition Plan, therefore, consolidates several initiatives and lessons learned by Cemig as a starting point for a more integrated and robust set of good practices and climate goals capable of giving greater clarity to the path that the organization has already been successfully tracing.

4.2.3 | Scenario analysis

In 2021, Cemig conducted a first study considering scenario analysis to compose its Climate Change Adaptation Plan, which guided the identification of priority issues and actions that should be included in the Company's Strategic Planning in the field of climate. The study considered as a transition scenario the Deep Decarbonization Pathways (DDP) centered in Brazil, simulating two panoramas of GHG emissions in the country until 2050, and the focal issues raised by Cemig in this study had as a starting point, mainly, the recognition of its water dependence and its performance in a sector that is responsible for a large part of the greenhouse gas emissions in the world.

In 2022, Cemig updates the study with the aim of updating estimates on the impacts of climate change on its operations by 2050. The assessment of the physical risk of the climate was carried out using historical information and using scenarios available in the sixth phase of the Coupled Model Intercomparison Project (CMIP6).

In order to evaluate the behavior of the main meteorological variables that impact the company's activities, the Climate Monitor was created, a tool that focuses, in its first version, on the state of Minas Gerais. The variables analyzed in this first version are precipitation, temperature, humidity and wind, in addition to the occurrences of fires, lightning and the issuance of meteorological alerts. This initiative differs from the company's usual monitoring because it focuses on analyses related to possible signs of climate change, that is, anomalous values.

Cemig analyzed the scenarios for the variables precipitation, temperature, humidity, wind speed and cloudiness for the following models:

Table 3. Models used in the studies of climate change scenarios

MODEL	INSTITUTION RESPONSIBLE	COUNTRY OR REGION	RESOLUTION (LON X LAT)	
AWI-CM-1-1-MR	Alfred Wegener Institute	Alemanha	0,94	0,9
CAMS-CSM1-0	Chinese Academy of Meteorological Sciences	China	1,13	1,1
CESM2	National Center for Atmospheric Research	EUA	1,25	0,9
CNRM-CM6-1-HR	Centre National de Recherches Meteorologiques	França	0,5	0,5
EC-Earth3	EC-Earth-Consortium	Europa	0,7	0,7
EC-Earth3-CC	EC-Earth-Consortium	Europa	0,7	0,7
HadGEM3-GC31-MM	Met Office Hadley Centre	Reino Unido	0,8	0,6

Source: Cemig.

The analysis carried out by Cemig's team allowed the identification of the climate risk for each of the company's plants and for others in which Cemig has an interest. Considering the analysis of the scenarios described above, with identification of the physical risks, a quantitative and qualitative analysis of their impacts on the company's operations, as well as their impact on the business, was carried out. These models have been applied to the SSP scenarios described and over the next few years the number of models used should be expanded, as well as the analyses.

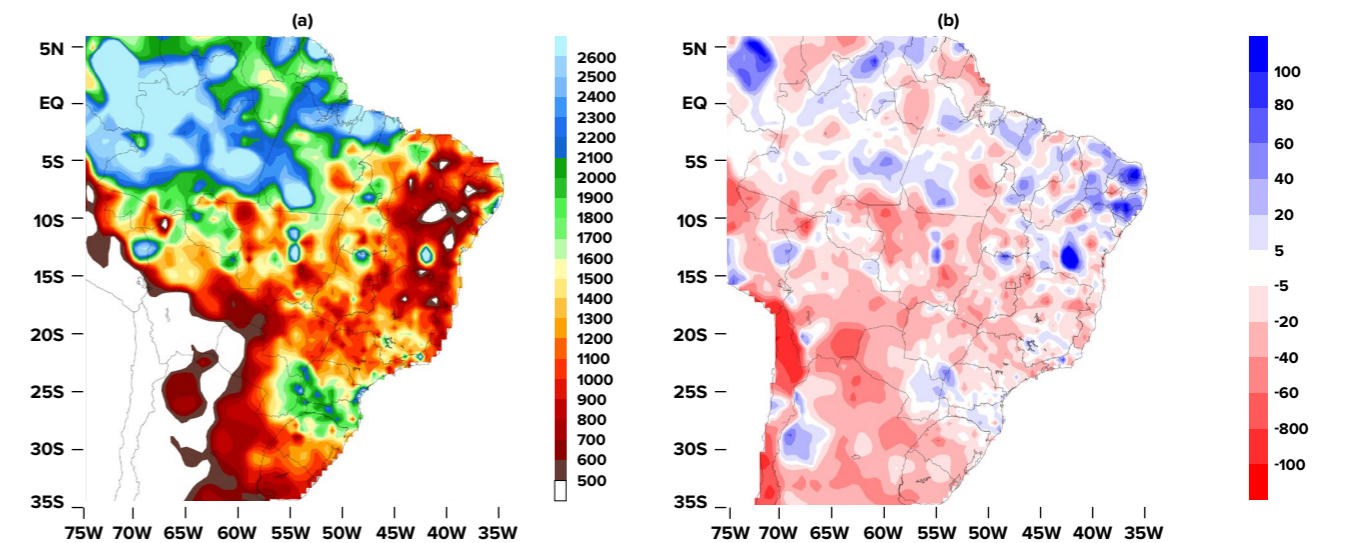
In terms of physical risks, the main issues investigated by the scenario analysis and its results in the study are:

WATER SCARCITY AND THE IMPACT ON THE COMPANY'S HYDROELECTRIC PLANTS

In 2022, analyses of this risk were carried out for 77 hydroelectric plants, including Cemig plants and other companies, evaluating the possible changes in the rainfall regime of these projects, with identification of physical risks, and a quantitative and qualitative analysis of their impacts on the company's operations, as well as their impact on the business.

The observed precipitation of 2022 was evaluated using data at grid points from the Climate Prediction Center (CPC) of the National Oceanic and Atmospheric Administration (NOAA) and the set belonging to the National Institute of Meteorology (INMET). Figure 11 below shows that the largest volumes occurred between the North, in absolute terms, and the Northeast, in relative terms, while the largest negative anomalies occurred in the Midwest and Rio Grande do Sul.

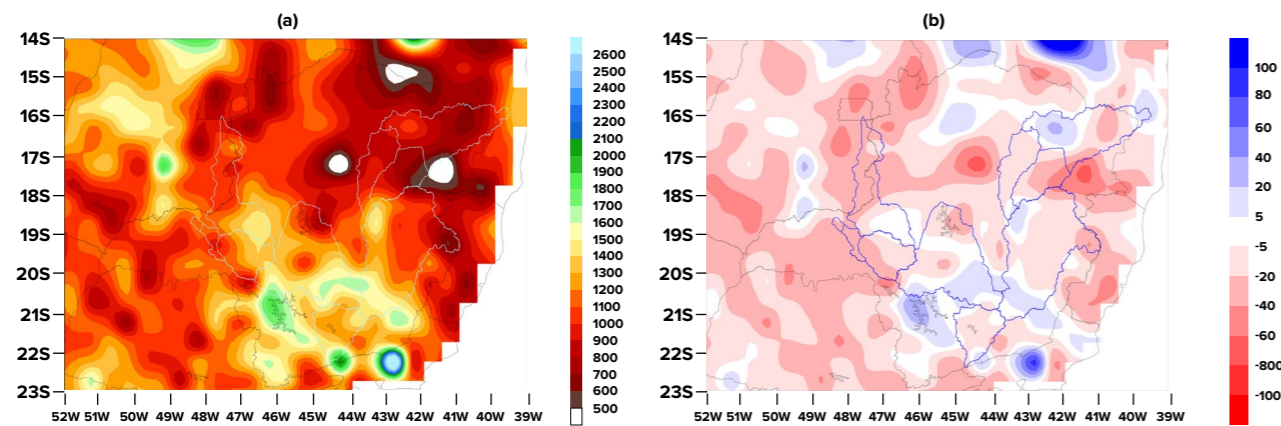
Figure 11. Total precipitation (mm) of 2022 (a) and precipitation anomaly (%) relative to the average (b) for Brazil



Source: CPC/NOAA

Figure 12 shows the main basins where more than 90% of Cemig's installed power is inserted, and the precipitation analysis shows that the distribution of rainfall was quite heterogeneous, with areas of positive anomalies in the Grande, Doce, Jequitinhonha and São Francisco basins, but also presenting negative values in adjacent areas, mainly in the Alto Paranaíba, in the stretch of the São Francisco downstream of Três Marias and in the incremental basin of the Irapé plant. Thus, it is indicated that the plants of Nova Ponte, Emborcação, Camargos and Aimorés were the ones that saw the greatest impact.

Figure 12. Total precipitation (mm) of 2022 (a) and precipitation anomaly (%) relative to the average (b) for Brazil



For example, for the Três Marias power plant, in a future time, the scenarios point to a reduction in the precipitation of the basin in which it is included until approximately the year 2030. In the case of the Três Marias plant, only one of the models showed an increasing trend. Regarding the scenarios, even the most optimistic ones present a fall or stability in the next 10 years but followed by recovery. With the most pessimistic (SSPs 3, 4 and 5) there are sharp falls and, in some cases, no recovery. Figure 13 and Figure 14 present some of the results found in two different models.

Figure 13. Example of the monthly average rainfall (mm) from 2022 to 2051, for the scenarios SSP126, SSP245, SSP370 and SSP585, of the model AW1-CM11-1-MR, with emphasis on the Três Marias region

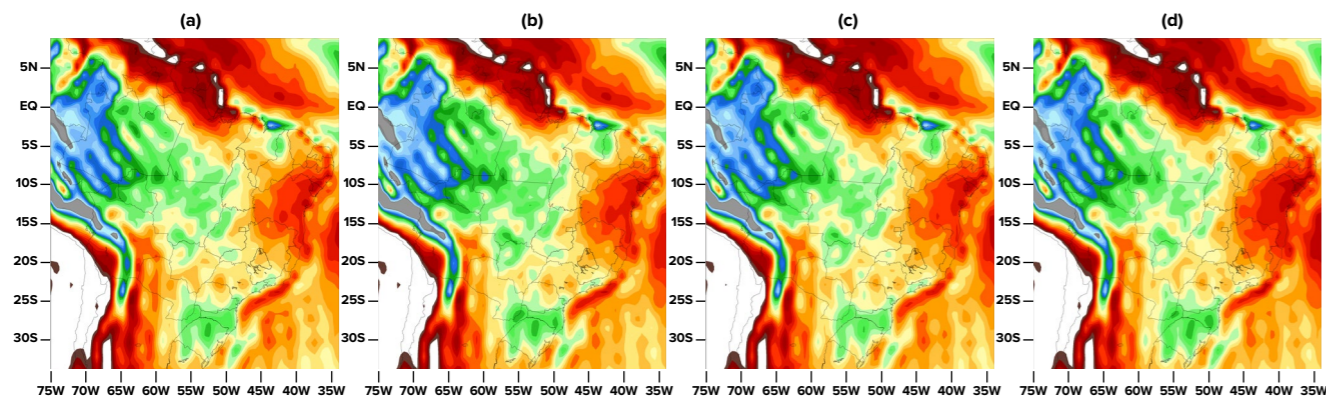
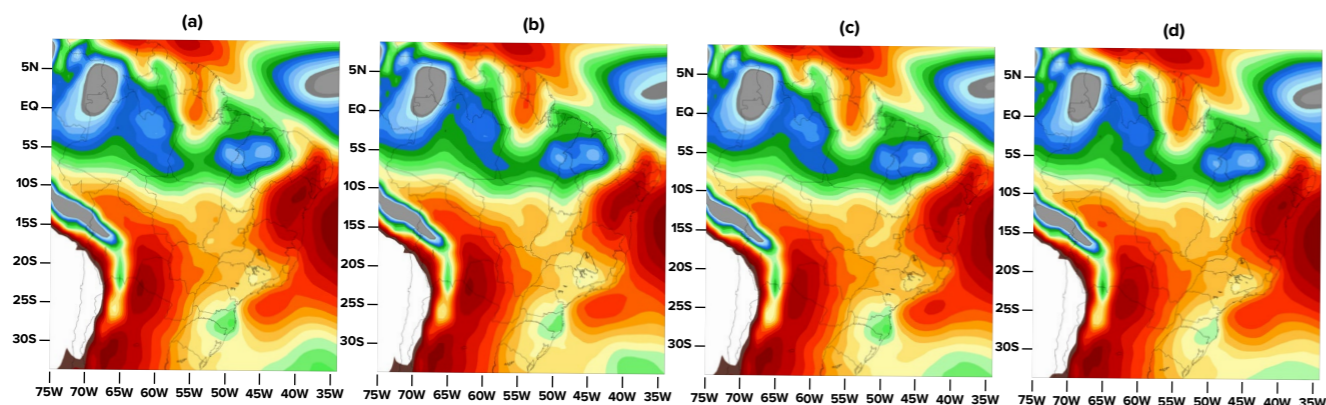


Figure 14. Example of the monthly average rainfall (mm) from 2022 to 2051, for the scenarios SSP126, SSP245, SSP370 and SSP585, of the CESM2 model, with emphasis on the Três Marias region



For the remaining power plants, the vast majority of those concentrated in the Southeast and Midwest follow the above pattern, with some specific differences, which may indicate a risk of a sharp fall in precipitation for the coming years, with strong pressure on the operation of the National Interconnected System. Based on this risk, Cemig has been improving and/or creating systems related to increasing efficiency in the operation of its reservoirs and environmental alerts.

As Cemig's electricity production is mostly hydraulic, changes that tend to water scarcity can cause a reduction in generation capacity. Historically, the Company has already experienced the impacts of these risks in the last 05 years due to water scarcity in the basins where it has a hydroelectric generation project. This risk is mitigated through the diversification of the electricity matrix and the implementation of improvements in the management of water resources.

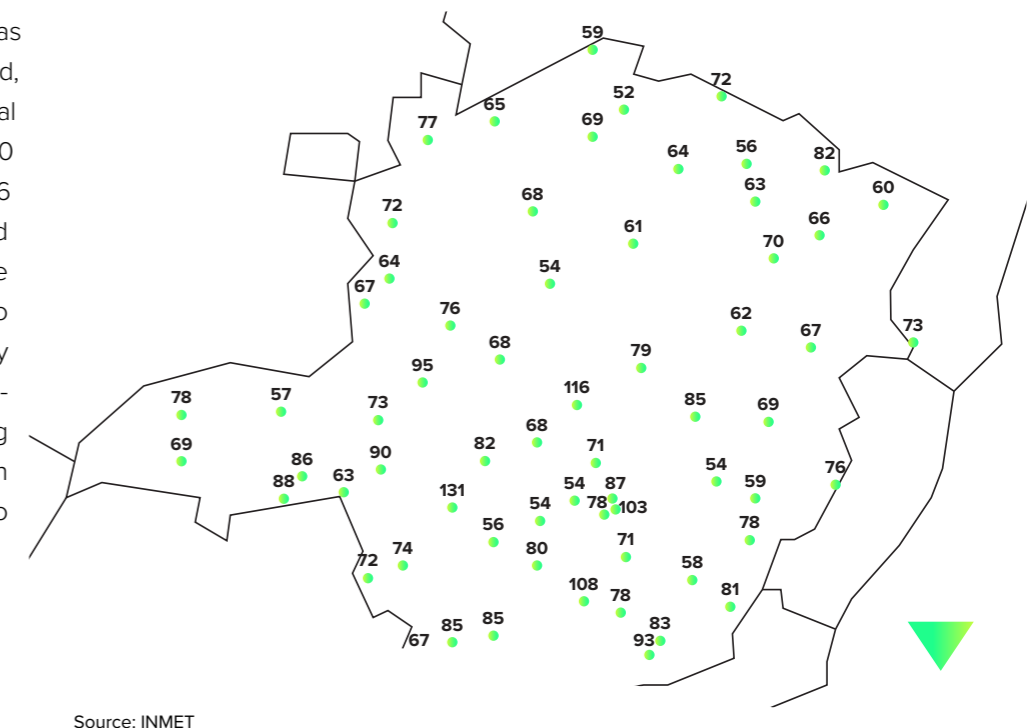
THE IMPACTS OF HEAVY RAINFALL ON ENERGY DISTRIBUTION

Heavy rains pose a risk to Cemig's assets because of their potential to cause physical damage to the facilities that transport and distribute energy, leading to their unavailability. In 2022, no rainfall records were recorded in relation to previous years, but when the values of maximum precipitation accumulated in 24 hours were analyzed, four plants were identified in areas of distinct behavior.

When compared to the data observed in previous years, it was found that the stations of Passos, Salinas, Ibitité and Patos de Minas had records recorded in terms of maximum precipitation accumulated in 24 hours, in 2022, in the state of Minas Gerais. This is important because the increase in extreme precipitation events is one of the expected patterns for the coming years, if warming keeps pace with annual rates, posing a danger to society and the company's assets.

In the case of wind, the maximum gusts recorded in Minas Gerais in 2022 were analyzed, using INMET data. In several locations, gusts above 100 km/h were observed, with 6 stations presenting record values (Figure 15). These events pose a real threat to the power supply, as they are directly related to unscheduled shutdowns, arising from falling trees, broken wires, among others, due to windstorms.

Figure 15. Maximum gusts recorded in 2022 (km/h)



Source: INMET

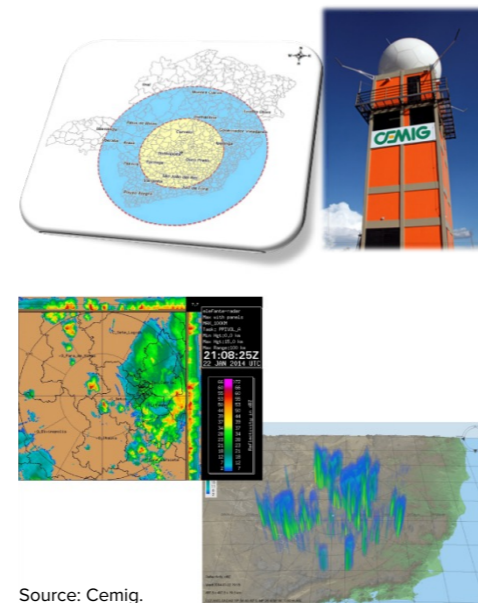


Cemig continuously monitors weather conditions, sending real-time weather alerts through its weather team. The purpose of these alerts is to prepare teams for possible weather events that could lead to unscheduled shutdowns and is an excellent means of gauging the amount of severe events that have occurred in the company's concession area.

The meteorological monitoring system consists of dozens of automatic data collection stations, its own network for the detection of atmospheric electrical discharges, a satellite image reception station and a C-band meteorological radar, strategically installed in the center of the state of Minas Gerais (Figure 16).

Thus, from the information provided by this system in real time, Cemig's team of professionals can issue weather alerts to the distribution and transmission operation centers. In this way, the teams of these centers and the field teams can work together to anticipate possible damage to Cemig's assets, seeking a rapid reestablishment of power outages, for example.

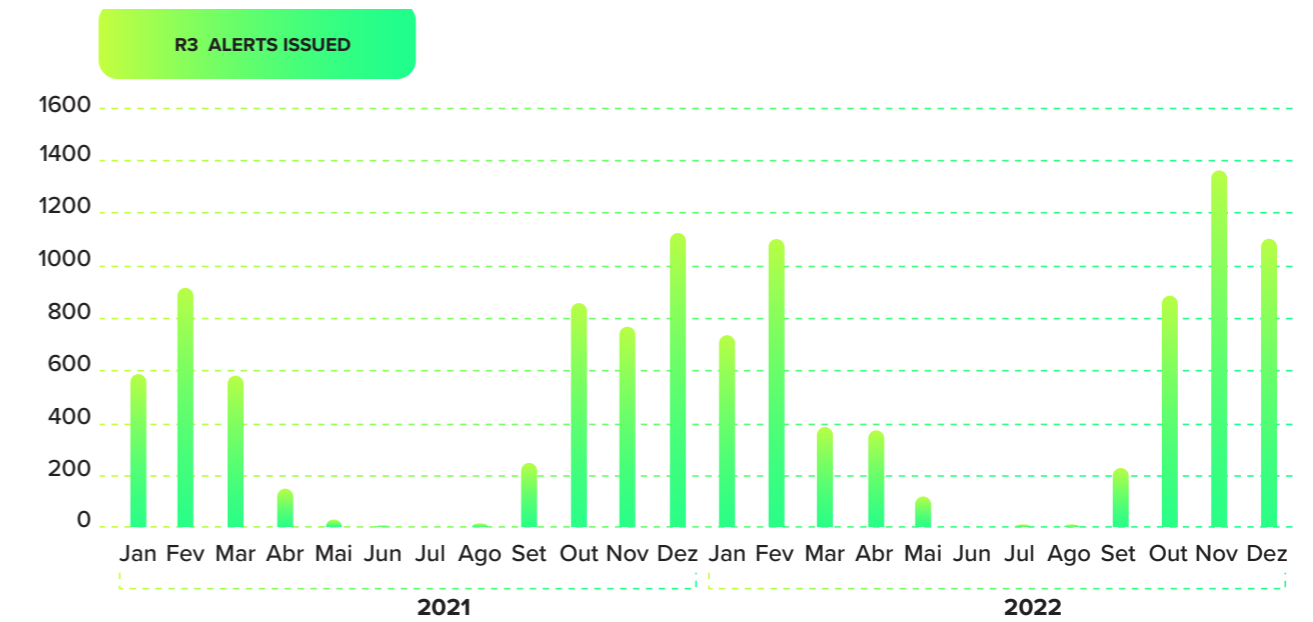
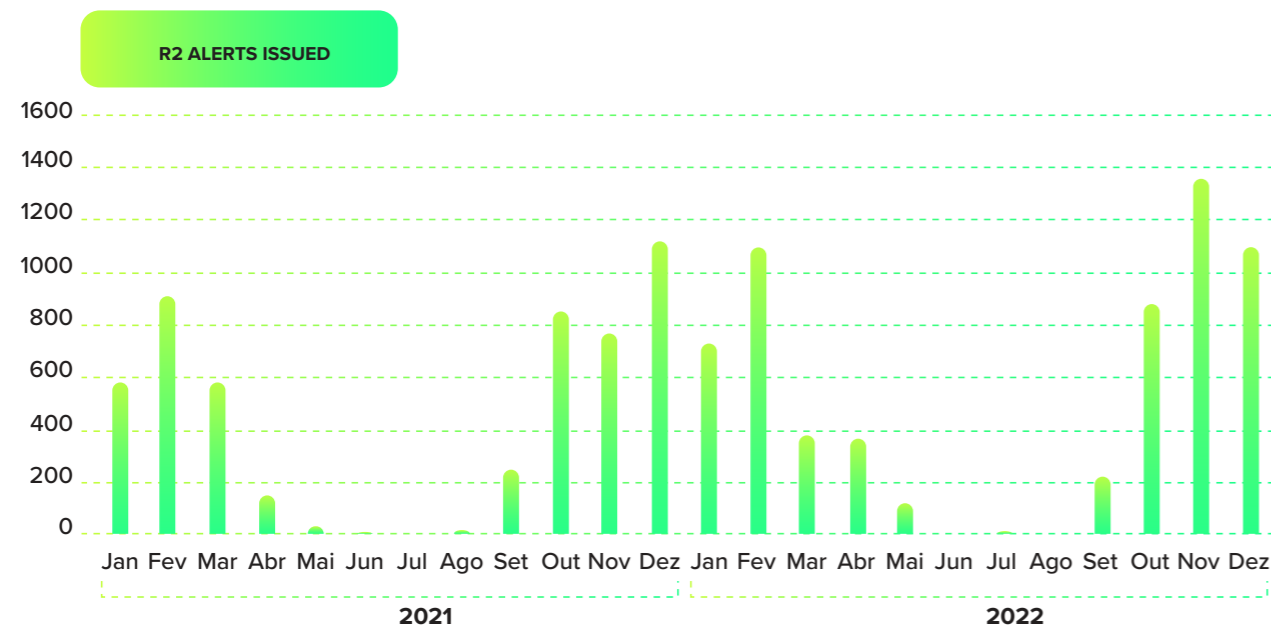
Figure 16. Cemig's Meteorological Radar and an example of its data



Source: Cemig.

Figure 17 shows the alerts issued by level, with R2 being the moderate risk level and R3 being the severe risk. There was an increase of approximately 19% in the issuance of R2 alerts and 223% of R3 alerts, when comparing the years 2021 and 2022.

Figure 17. Weather alerts issued in 2021 and 2022

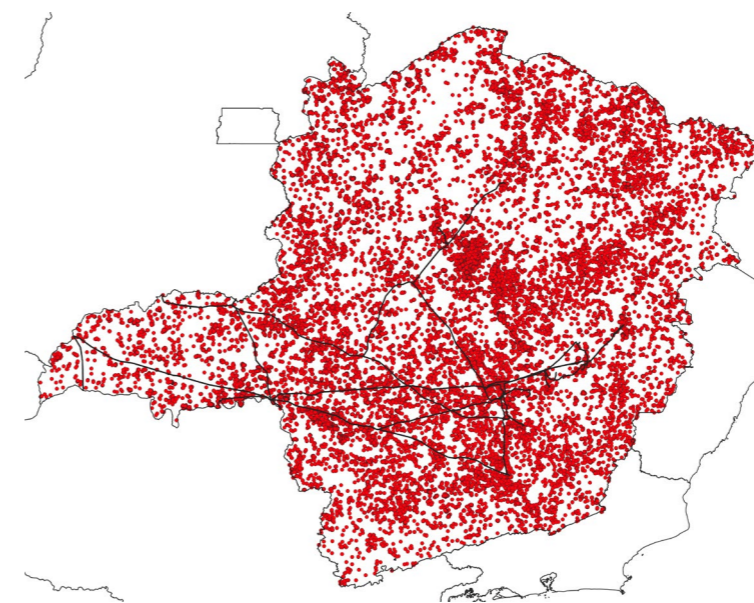


Source: Cemig.

THE IMPACTS OF FIRES AND LIGHTNING STRIKES ON THE TRANSMISSION AND DISTRIBUTION OF ENERGY

Fires, within or near easement strips, can cause unavailability of transmission lines. Responsible for several shutdowns in the state, the fires can affect not only small lines, but also large power transmission lines. In 2022, a total of 7,790 fire outbreaks were recorded in the state of Minas Gerais alone, as shown in Figure 18. Despite the large number of events, the year presented values below the average of 9,845 outbreaks, according to data from the Brazilian National Institute for Space Research (INPE), shown in Figure 19.

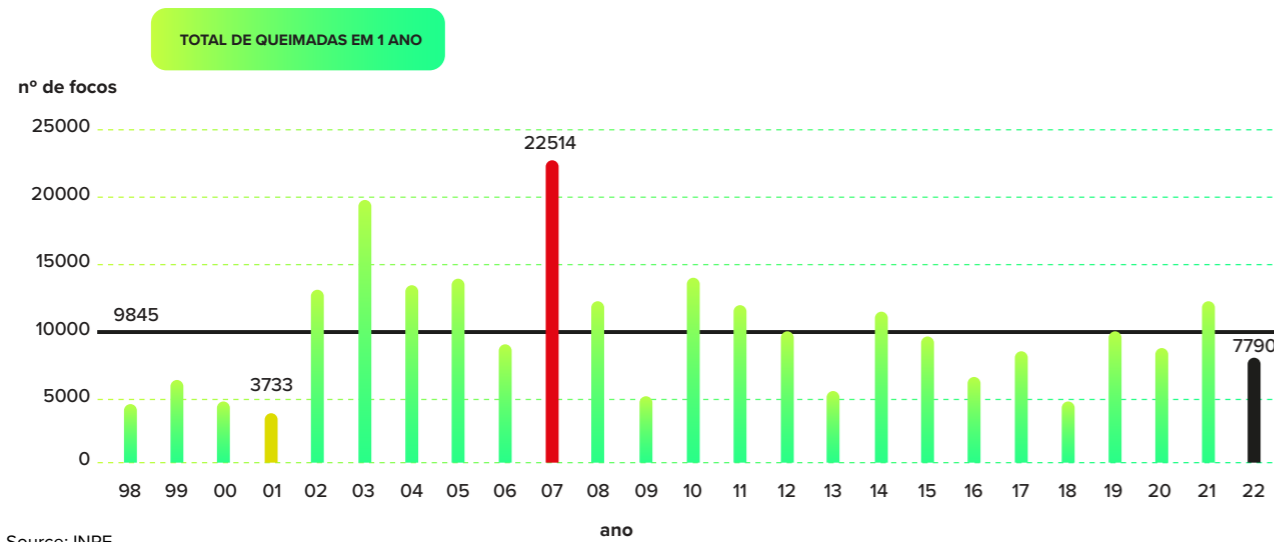
Figure 18. Fires recorded in 2022 in Minas Gerais



Source: NASA.

To increase resilience to fires, Cemig developed Cemig's Fire Monitoring, Analysis and Alert System (SMAQ-Cemig), consisting of tools and techniques that allow the company to identify the regions affected by fires along its transmission and distribution lines, allowing a more efficient analysis of shutdowns, the optimization of cleaning activities of the easement strips and a more effective environmental education with the nearby communities. In addition, the System allows monitoring and issuing alerts in real time (Figure 20), allowing field teams to be sent to deal with fires or to activate the Fire Department. Finally, it also allows the calculation of the physical risk of ignition of fires, which helps to size the size and displacement of field teams.

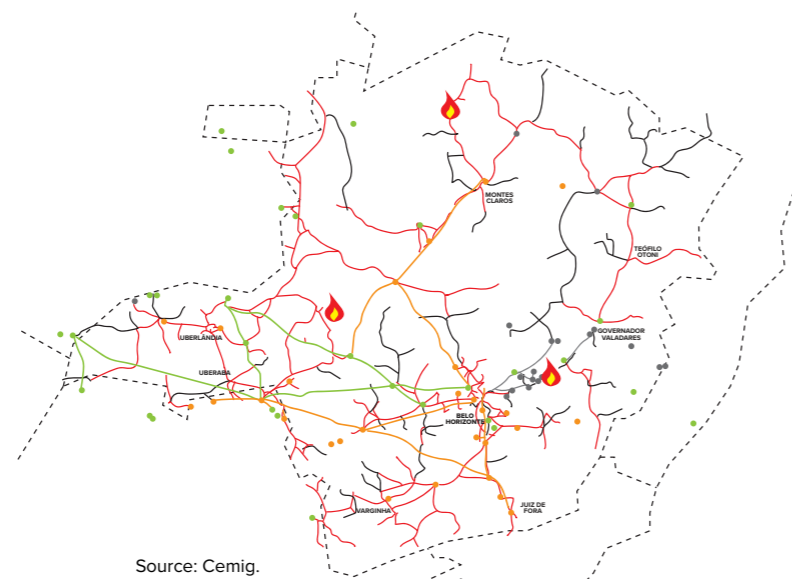
Figure 19. Historical evolution of the fires recorded in Minas Gerais



Source: INPE.

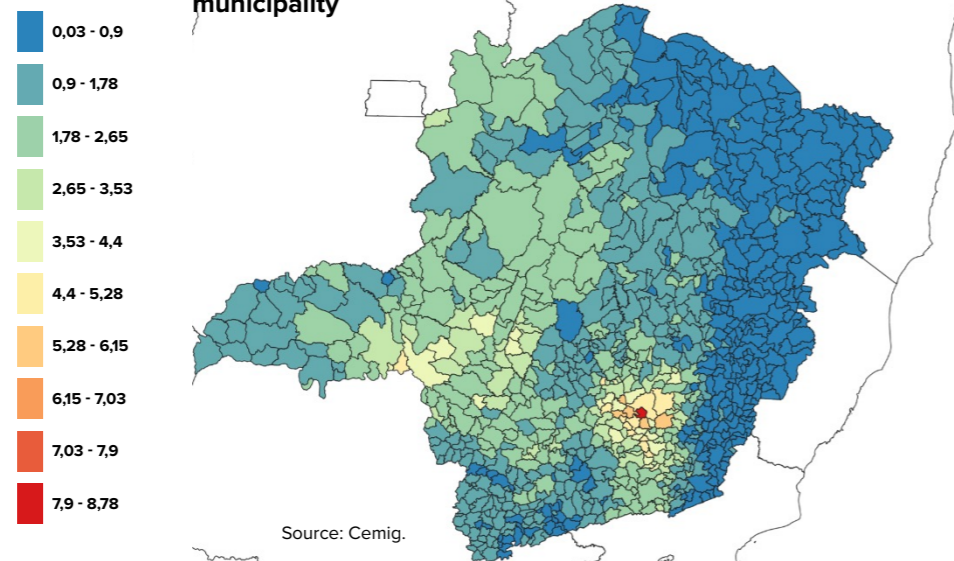
Another phenomenon that represents a risk to Cemig's activities is the occurrence of lightning strikes, capable of causing long power shutdowns and capable of affecting both the distribution and transmission of energy. In 2022, in the state of Minas Gerais, the Zona da Mata, the Central Region and the Alto Paranaíba were the regions most affected by lightning, as can be seen in Figure 21

Figure 20. Cemig's fire monitoring and alerts portal



Source: Cemig.

Figure 21. Density (strikes/km2) of lightning recorded in 2022, by municipality



Source: Cemig.

These phenomena are increasingly associated with the effects of an unfavorable microclimate, typical of large urban centers. This type of event can take indicators that measure the quality of energy supply to critical levels. The extrapolation of the limits of the indicators DEC (Equivalent Duration of Interruption per Consumer Unit) and FEC (Equivalent Frequency of Interruption per Consumer Unit) generate a risk for the Company. Failure to comply with the regulatory targets of the quality indicators for 2 consecutive years or in the fifth historical year may lead to the opening of the concession expiration process by Aneel, implying the risk of loss of the concession.

To evaluate the effectiveness of the actions and initiatives carried out in relation to energy quality, Cemig uses the DEC and FEC indicators as parameters. In 2022, approximately R\$ 62 million in compensation was paid to Cemig D's customers for violation of the individual indicators of continuity of electricity supply (DIC, FIC, DMIC

and DICRI), according to ANEEL data from February 2023.

For the 2018-2022 cycle, Cemig invested R\$ 7.8 billion in the expansion of substations, implementation of new substations, reclosers, smart meters, among other actions that allow Cemig to offer a better-quality service with fewer interruptions and with a reduced response time if they occur. For the next cycle, in addition to investments in these fronts, investments are also planned in the underground network, conversion of the single-phase system to the three-phase, and in a low-voltage zero network, among others.

4.3 | RISK MANAGEMENT

<p>GOAL</p>	<p>To disclose how the organization identifies, evaluates and manages risks related to climate change.</p>
<p>TCFD GUIDELINES</p>	<ul style="list-style-type: none"> Describe the processes used by the organization to identify and assess risks related to climate change. Describe the processes used by the organization to manage risks related to climate change. Describe how the processes used by the organization to identify, assess, and manage risks related to climate change are integrated into the organization's overall risk management.

The implementation of corporate risk management took place in 2003 and has been continuously improved by Cemig. This management is process-based and is aligned with the Company's Master Plan and strategic planning, with the main guiding element being the Corporate Risk Management Policy and Internal Controls.

4.3.1 | Risk identification and assessment process

Cemig’s current Corporate Risk Management and Internal Controls Policy was updated in 2021 and its approval is the responsibility of the Board of Directors, as provided for in Cemig’s Bylaws. It is also the responsibility of the Board of Directors to validate the Company’s risk matrix, which is updated annually. This involvement of the Company’s highest governance body with risk management demonstrates not only the relevance of the topic, but also Cemig’s alignment with good Risk Management and Corporate Governance practices.

Based on Cemig’s Corporate Risk Management and Internal Controls Policy, the Company’s risk appetite is defined, which signals the Precautionary Principle (GRI 102-11) as one of the factors considered in the decision-making flow related to risk management, in addition to attention to the legal and regulatory precepts that determine the activities of companies in the electricity sector in Brazil. In addition, the policy is guided by guidelines that translate the best market practices, being aligned, especially, with the governance model called “Three Lines Model”.

The “Three Lines Model” is a simple and effective way to define and clarify the roles and responsibilities related to risk management, coordinating all the integral parts so that there is no duplication of efforts or gaps in controls, thus improving the performance of risk management and internal controls. The model proposes the orientation of responsibilities and not the creation of departmental structures to serve it, with the holder of each risk being responsible for managing its own risk and/or control mechanism. In this way, the risk management process is managed by each area of Cemig, holder of their respective risks, and centrally monitored by the Risk Management and Internal Controls.

The first line is composed of all administrative and business areas of the Company. Managers and employees in these areas are responsible for leading and directing actions (including risk management) and applying resources to achieve the organization’s objectives.

In the second line are the functions that have the supporting role in risk management. In addition, this line is responsible for monitoring the implementation of risk management practices and internal controls in the first line and assisting managers in defining risk tolerance and how risk information and controls are disclosed internally in the organization. The areas of Compliance, Risk Management and Internal Controls are responsible for coordinating the respective processes at Cemig and supporting the holders of risks and controls.

The third line is composed of the internal audit of the organization. It is responsible for communicating independent and objective assessment and advice to management and the governance body on the adequacy and effectiveness of governance and risk management (including internal control), to support the achievement of organizational objectives, promote and facilitate continuous improvement.



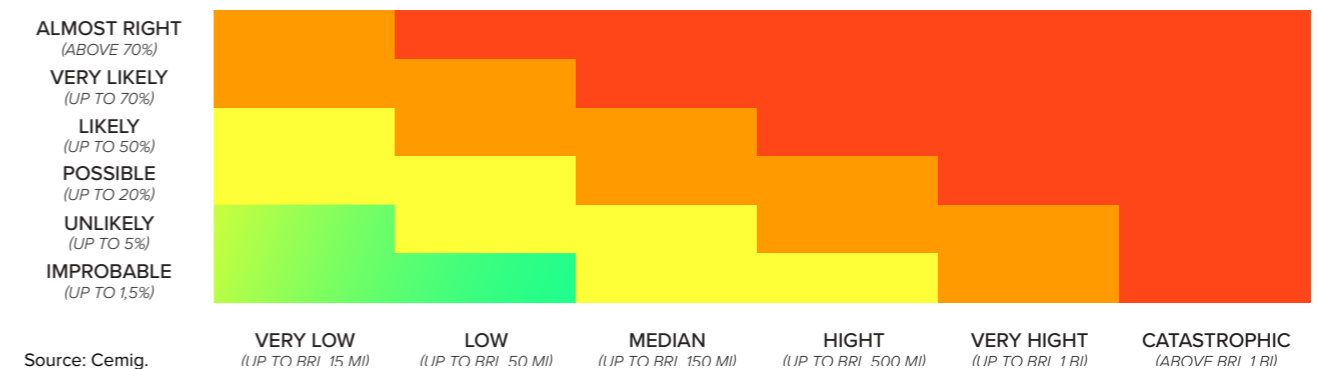
4.3.2 | Risk management process

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

The process is represented in a 6x6 risk matrix, as shown in Figure 22. As mentioned, each management is responsible for identifying the risks related to its context. The evaluation is made considering the probability of materialization and the maximum financial impact that this materialization would represent for the Company. While the financial impact is a quantitative estimate, the probability is assessed qualitatively by each area responsible for the identified risk.

Figure 22. Cemig’s risk matrix.



The result of the cross between the probability of materialization and the respective impact in financial terms offers the necessary coordinates for the prioritization of risks by Cemig. In this process, it is important to note that an impact is considered substantial whenever its effect in financial terms is ‘Catastrophic’ (regardless of the probability), and will also be classified in the same way respecting a proportionality between probability x financial impact, according to the orange and reddish areas on the graph. This classification applies to the entire Cemig, contemplating the risks associated with climate change and all stages of the value chain.

As a practical example in the context of operations, the substantial impact may result, for example, from an event that interrupts the distribution of energy in a particular region, which may have implications such as demand for local operations, fines, among other financial and non-financial consequences. For this reason, Cemig’s governance structure foresees that the Board of Directors and the Committees – such as the Corporate Risk Monitoring Committee (CMRC) – also assess the risks from the perspectives of environmental and reputational impact, factors that will influence the risk response strategy.

Table 4 presents the costs of risk management in 2021 and 2022.

Table 4. Comparison of the total cost of risk and opportunity management in 2021 and 2022

2021		2022	
Total cost Risk management	Total cost Opp. management	Total cost Risk management	Total cost Opp. management
R\$ 553.067.784,33	R\$ 2.539.776.076,66	R\$ 1.366.016.736,24	R\$ 1.450.000,00

Source: Cemig Annual and Sustainability Report 2022.

In order to provide information for the High Administration to make decisions regarding the most relevant risks and opportunities, Cemig structured a process for risk management based on the guidelines established in the Risk Management and Internal Controls Policy, enabling the mapping and evaluation of both strategic risks and those arising from operational activities. This process is coordinated by the Risk Management and Internal Controls, which provides technical support to the different areas of the Company, and is structured as follows:

1 IDENTIFICATION

In the risk identification phase, the area responsible for centralized risk management and internal controls consults the managers of the areas correlated to the identified themes, including those areas that interact with external stakeholders, such as investor relations, strategic planning, sustainability, and general secretariat.

Each management, therefore, maps and reviews the risks associated with its activity, indicating the causes, and classifying them according to the potential impact if the risk materializes and the probability of occurrence.

2 ASSESSMENT

After consulting the leaders, a proposal for a risk matrix is presented to the CMRC, which is composed of members of different boards and brings considerations for improvements. Subsequently, the matrix is forwarded for deliberation by the Executive Board, which also improves the product, forwarding it to the Risk Committee of the Board of Directors and the Board of Directors. In addition, the proposed matrix may be presented to the supporting bodies of the Board of Directors, such as the Audit Committee and the Fiscal Council.

From the 6x6 risk matrix, the result of the product between the probability of materialization of the risk and the impact in financial terms for each of the risks considered, Cemig builds the Top Risks Matrix, covering priority risks within its strategic pillars, such as Generation, Transmission, Distribution, Commercialization, Information Technology, Institutional Regulatory and/or eventual adjustments to adapt to the current Strategic Planning.

This classification of Top Risks occurs annually and involved, in 2022, all 14 Cemig Directors, mapping of 40 risks in total, of which 30 are Top Risks and another 10 compliance risks.

3 RESPONSE

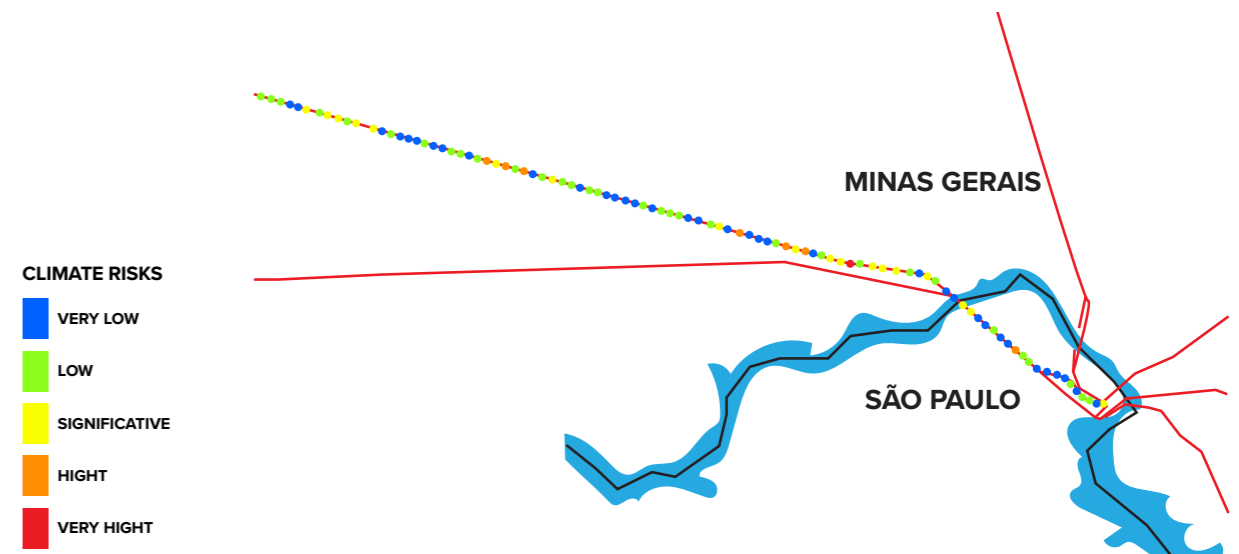
For the risks already mapped by the Company, a response proposal is already underway, with a status update and a review of the actions in order to bring improvements or reassess the priority given to that risk. In the case of new mapped risks, all actions and controls are surveyed to mitigate the respective risk, in a process that involves the participation of the Board of Directors, the CMRC, and the respective Executive Boards, including the Finance Department and the Strategy Department, which have an important role in ensuring the alignment of actions and the budget.

Once the actions have been defined, they are forwarded by the respective Directors to each of the areas, which will be responsible for the implementation and monitoring of the actions, reporting the progress periodically.

For the management of physical risks, Cemig has been developing a Climate Risk Bank of its assets. In the first version of this Bank, the history of fires and lightning by Cemig transmission line/tower was compiled, so that it was possible to identify the most likely to be affected by events that may cause shutdowns. To a certain extent, this action can provide a more efficient management of investments in reinforcement and cleaning of easement strips. In the current phase of development, transmission and distribution substations are being included, as well as severe event prediction data for each of these points. The alignment of this methodology with ISO 14.091: 2021 – Adaptation to climate change, is also being discussed by internal teams and consulting teams.


Therefore, the objective is for Cemig to have a unique tool that encompasses all the risks inherent to the assets, also considering the information of meteorological origin, and allowing fast, constant, and efficient responses to each challenge. Figure 23 presents an example of a map with the risk associated with each transmission tower having as a data source the fires of the historical period.

Figure 23. Example of the climate risk calculated for a Cemig transmission line



Source: Cemig

Among the risks mapped, the change in the precipitation pattern, associated with water scarcity, and the risk of increasing the frequency and intensity of extreme weather events, such as cyclones and floods, are highlighted. The processes of addressing these risks, in summary, occurred as follows:



RISK OF EXTREME WEATHER EVENTS

<p style="text-align: center;">SITUATION</p> <ul style="list-style-type: none"> Cemig verified that events such as storms, with the potential to damage installations and consequently interrupt service provision, may occur more frequently and with greater intensity in certain regions of the country, according to studies of scenario analysis. This risk was understood as a priority, with definition of the Distributor's Development Plan (PDD). 	<p style="text-align: center;">TASK</p> <ul style="list-style-type: none"> At first, actions that could impact the improvement of service provision by mitigating potential damage from intense weather events were listed. Based on this identification, a budget projection was made for the 2018-2022 cycles, and subsequently for the 2023-2027 cycle, outlining the respective action plans.
<p style="text-align: center;">ACTION</p> <ul style="list-style-type: none"> For the 2018-2022 cycle, Cemig invested BRL 7.8 billion in the expansion of substations, implementation of new substations, reclosers, smart meters, among other actions that allow Cemig to offer a better quality service with fewer interruptions and with a reduced response time should they occur. For the next cycle, in addition to investments on these fronts, investments are also planned in the underground network, conversion from the single-phase to the three-phase system, and in a low-voltage zero network, among others. 	<p style="text-align: center;">RESULT</p> <ul style="list-style-type: none"> In 2022, BRL 1.480 million were invested in PDD. Of this total investment, R\$ 1.22 million is considered related to risk mitigation, which are stratified as follows: investments in high voltage expansion and reinforcement (R\$ 906 million), renovation of the high voltage system (R\$ \$32 million), reinforcement of medium and low voltage networks (R\$126 million) and medium and low voltage network renovation (R\$ 159 million).



RISK OF WATER SCARCITY

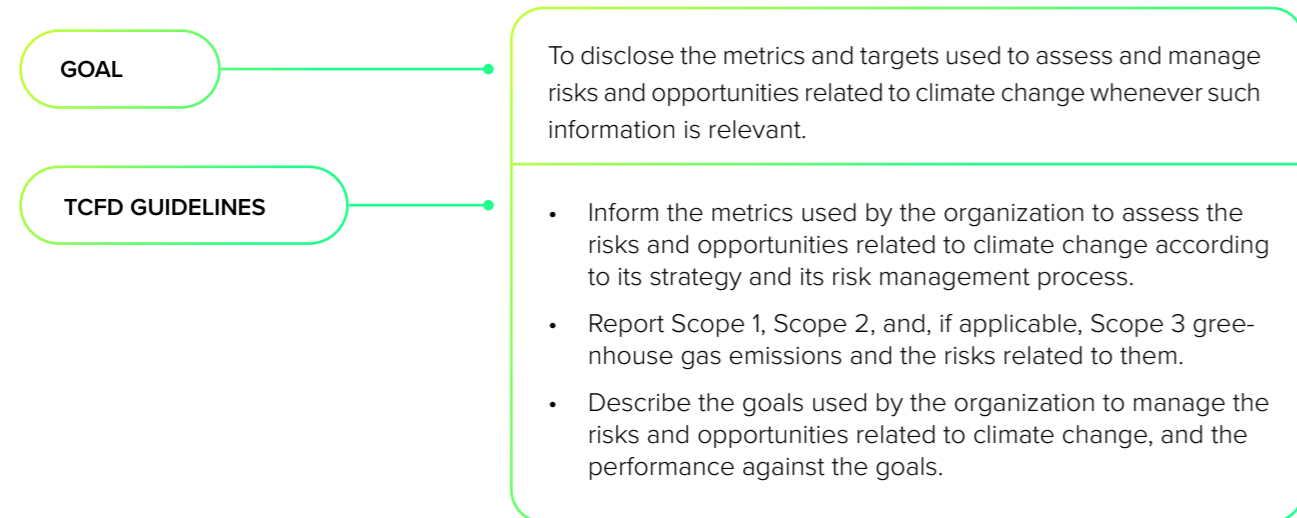
<p style="text-align: center;">SITUATION</p> <ul style="list-style-type: none"> Cemig identified a great dependence on water resources for its operation, a resource that has been affected by climate change. The Company understands that this dependency can generate substantial impacts whenever there is water scarcity. This risk was presented to the Board of Directors, in line with the process described above. 	<p style="text-align: center;">TASK</p> <ul style="list-style-type: none"> Given the importance of the issue, Cemig carried out a study to describe the risk, verify the units most exposed to it, and define mitigation measures.
<p style="text-align: center;">ACTION</p> <ul style="list-style-type: none"> Based on the study's recommendations, Cemig identified not only actions for efficient management of the reservoir, but also the opportunity to diversify the energy matrix, expanding the generation of energy from wind and solar sources. Therefore, Cemig determined in its strategic planning the goal of investing BRL 3.2 billion, by 2027, in Cemig SIM's solar energy projects. Another outstanding action comes from Cemig GT, focusing on the installation of photovoltaic solar plants in Jusante and Boa Esperança, whose projects are budgeted at R\$ 824 million. 	<p style="text-align: center;">RESULT</p> <ul style="list-style-type: none"> In 2022, as part of the parent company's diversification strategy, Cemig SIM acquired 100% of the stake in special purpose companies that own three solar photovoltaic power plants. The subsidiary closed the year 2022 with a total of 7000 consumer units. At the same time, Cemig GT signed a supply contract with CET Brazil, a subsidiary of the State Grid Corporation of China, for the installation of photovoltaic solar plants in Jusante and Boa Esperança.

Therefore, according to the example above, when it comes to opportunities, Cemig encourages the mapping process by each Board of Directors to take place in parallel with the process of identification, evaluation, and response to risks. In general, it is the ESG guidelines present in the Company's strategic planning that guide the process of identifying, evaluating, and executing opportunities.



Photo by Loris Lambert on Unsplash

4.4 | METRICS AND TARGETS



Since it began accounting for emissions in the Greenhouse Gas Inventory, Cemig has established reduction targets in line with its sustainability strategy. With the maturation of the theme within the Company, today Cemig has renewable energy targets, Net Zero and, in 2022, submitted a goal to the Science-Based Targets initiative aimed at building a more ambitious plan, reaffirming its commitment to climate risk management.

4.4.1 | Company Metrics

In order to monitor its impact on the environment and measure progress in the climate change agenda, Cemig counts greenhouse gas emissions in all its subsidiaries and activities. This control allows the Company to map the main sources of emissions and prioritize the reduction initiatives that generate the greatest results.

In terms of Cemig’s emissions profile, under Scope 1, the main emissions are agricultural and land-use change, followed by the vehicle

fleet, fugitive emissions of SF₆ gas – arising from electrical equipment – and fugitive emissions from natural gas distribution. As for Scope 2, the volume of emissions is more prominent and results mainly from the electrical losses in the Transmission and Distribution systems, which Cemig has been fighting using technology, being a prominent front in the Strategic Planning of the next cycle.

Emissions in Scope 2 had, in 2022, a significant drop in relation to the emissions of 2021, since the emission factor of electric energy was three times lower due to lower use of thermals in the National Interconnected System (SIN). In relation to Scope 3, the main emission is associated with the commercialization of electric energy, and a strategy adopted

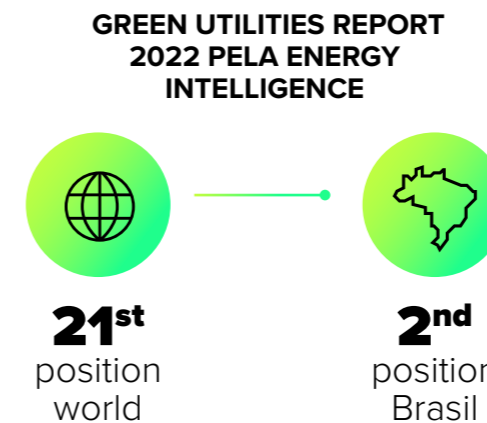
by Cemig for this scope has been the compensation of emissions through the expansion of renewable energy certificates following the I-REC Standard and Cemig-REC methodologies, which follows Cemig’s internal methodologies.

4.4.2 | Emissions data

Cemig has been preparing and publicly disclosing the Greenhouse Gas Inventory since 2011, consistent with its commitment to transparency of information, especially in terms of advances related to commitments to reduce emissions and adhere to a renewable matrix. According to the ranking released in the Green Utilities Report 2022 by Energy Intelligence – a leading company in energy information – Cemig has risen three positions since the previous year’s report and today occupies the 21st position among the top 100 concessionaires and independent producers of sustainable energy, being the second

Brazilian company to figure in the ranking, which considers total emissions and capacity from renewable energy.

Cemig’s GHG Emissions results took into account the activities of all the company’s business areas:



- CEMIG Geração e Transmissão and SPEs – wholly-owned subsidiaries of Cemig GT;
- CEMIG Distribution;
- CEMIG SIM;
- GASMIG;
- CENTROESTE.

In 2022, Cemig’s total emissions totaled 5,296,976.92 tCO₂e, which represents a reduction of 48% compared to the previous year, mainly caused by the change in the energy emission factor, which went from 0.1264 tCO₂e/MWh in 2021 to 0.0426 tCO₂e/MWh, according to data from the Ministry of Science,

REDUCTION OF 48% COMPARED TO THE PREVIOUS YEAR, MAINLY CAUSED BY THE CHANGE IN THE ENERGY EMISSION FACTOR

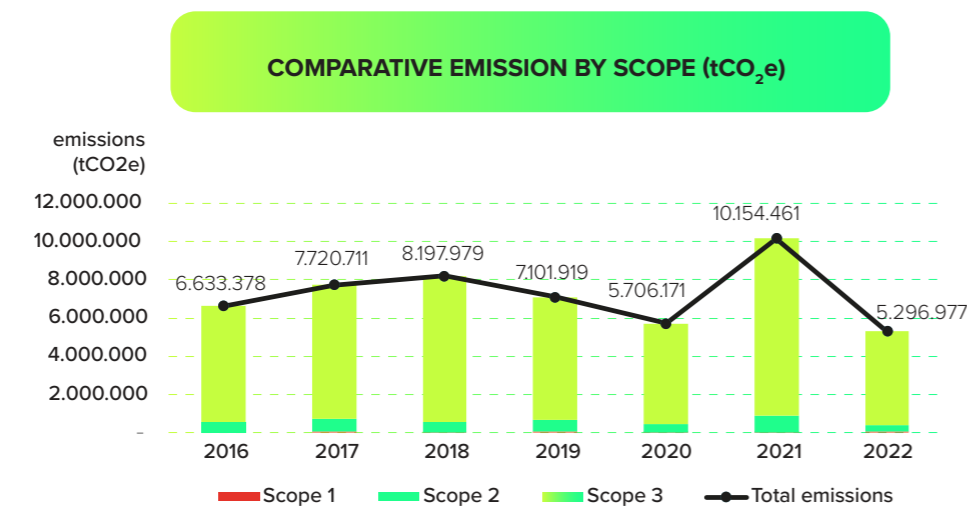
Technology and Innovation. Cemig’s total emissions intensity was 0.20 tCO₂e/MWh in 2021 and 0.09tCO₂e/MWh in 2022, a reduction of 55%. The intensity of total emissions without considering Gasmig’s emissions was 0.14 tCO₂e/MWh in 2021 and 0.05 tCO₂e/MWh in 2022. The results are better presented in Table 5 and the historical series is shown in Figure 24.

Table 5. Summary of emissions by emission category

SCOPE	EMISSION CATEGORY	EMISSIONS (tCO ₂ e)	SHARE (%)
SCOPE 1	Direct stationary combustion emissions	140.79	0.17%
	Direct emissions from mobile combustion	7,307.85	8.77%
	Agricultural activities and land use	69,593.51	83.49%
	Direct fugitive emissions	6,314.44	7.58%
	TOTAL SCOPE 1	83,356.59	1.57%
SCOPE 2	Electricity	1,734.83	0.59%
	T&D losses	290,031.42	99.41%
	TOTAL SCOPE 2	291,766.24	5.11%
SCOPE 3	Goods and services purchased	3.17	0.00%
	Waste generated in operations	582.98	0.01%
	Business travel	328.91	0.01%
	Employee home-work commuting	141.09	0.00%
	Upstream transport and distribution	33,012.14	0.67%
	Use of goods and products sold	4,887,785.80	99.36%
	TOTAL SCOPE 3	4,921,854.09	92.91%
TOTAL SCOPE 1 + 2 + 3		5,296,976.92	100%

Source: Emissions Inventory, 2023

Figure 24. Historical series of total emissions



Source: Emissions Inventory, 2023

4.4.2.1 | Scope 1

Scope 1 aggregated direct emissions from the categories ‘Stationary Combustion’, ‘Mobile Combustion’, ‘Fugitive Emissions’ and ‘Agricultural Activities and Land Use Change’. In 2022, Cemig’s emissions from this scope represented 83,357 tCO₂e or 2% of total emissions. Among the scope 1 emissions, emissions related to ‘Agricultural Activities and Land Use Change’ were responsible for the highest emissions of the scope, with 69,594 tCO₂e representing 1% of total emissions. Next, the ‘Mobile Combustion’ category accounted for the largest share of emissions, totaling 7,308 tCO₂e, or 0.13% of total scope 1 emissions. ‘Fugitive Emissions’ accounted for the third largest volume of scope 1 emissions, amounting to 6,314 tCO₂e or 0.11% of scope 1 emissions.

Cemig D presented the highest emission for this scope, totaling 70,294.03 tCO₂e, approximately 84% of scope 1. Followed by Cemig GT and SPEs that emitted 8,425 tCO₂e, about 10% of the scope 1 emissions. The Centroeste operating unit had emissions of 3,676 tCO₂e, which represents 4% of the company’s emissions. Gasmig was responsible for 1% of scope 1 emissions totaling 842 tCO₂e. Cemig SIM presented emissions of 0.03 tCO₂e for scope 1. Cemig H did not present emissions for this sector.

4.4.2.2 | Scope 2

Scope 2 aggregates indirect emissions related to ‘Electric Energy Consumption’, ‘Losses in Generation, Transmission and Distribution Systems’ and ‘Thermal Energy Consumption’. In the year 2022, the emissions related to scope 2 were 291,766.24 tCO₂e, representing 5.1% of total emissions.

1% of scope 2 emissions. The indicator of total losses (IPTD) was 11.11% in relation to the total energy injected into the system. Because it represents the main source of emissions, Cemig has been working on this scope through the implementation of smart meters, with replacements planned for the next investment cycle, as well as by inspection actions and regularization of clandestine connections.

Among the emission categories of scope 2, Losses in Transmission and Distribution Systems were responsible for most of the emissions, with 290,031 tCO₂e or 99% total of scope 2, followed by emissions from electricity consumption, which contributed 1,735 tCO₂e or

4.4.2.3 | Scope 3

Scope 3 emissions are indirect and result from activities that are not directly controlled by Cemig. In the GHG Emissions Inventory, the following categories were accounted for: ‘Purchased Goods and Services’, ‘Transportation and Distribution (Upstream)’, ‘Waste Generated in Operations’, ‘Business Travel’, ‘Displacement of Employees (Home-Work)’ and ‘Use of Goods and Services Sold’. Cemig presented 4,921,854 tCO₂e, which represents 86% of total emissions.

responsible for 1,321,603 tCO₂e, or 27% of total scope 3 emissions. Cemig, GT and SPEs were responsible for 902,134 tCO₂e, which represents 18% of scope 3. Cemig H was responsible for 12% of the scope’s emissions or 605,903 tCO₂e. Cemig Sim emitted 1.14 tCO₂e, which represents less than 1% of the scope’s emissions.

Gasmig had the highest emissions related to scope 3 with 2,092,213 tCO₂e or 42% of the scope emissions. Followed by Cemig D,

4.4.3 | Company Targets

In 2022, the company has committed to developing a science-based goal of reducing GHG emissions, as recommended by the Science Based Targets (SBTi) initiative, which establishes guidelines and methodologies for developing science-based emission reduction targets to limit global warming to 1.5°C.

Among the targets proposed, but not yet approved by the SBT initiative, are:

- 1 Reduction in 90% of absolute emissions of Scope 1, 2 and 3 by 2040, considering the base year of 2021, reaching the residual value of 1,015,446.09 tCO₂e, and considering Gasmig's emissions. In 2022, Cemig and Gasmig's total emissions were 5,296,976.92, representing a reduction of 48% compared to 2021 (10,154,460.93tCO₂).
- 2 Reduction of Scope 1, 2 and 3 emissions by 75.8% per MWh (traded energy) by 2030, considering 2021 as the base year and not including Gasmig's emissions. For 2022, the target is 0.1 tCO₂/MWh, and for 2030, the intensity target is 0.033 tCO₂/MWh. In 2022, the emission intensity of scopes 1, 2 and 3 was 0.09 tCO₂/MWh, and the target for 2022 is 0.1tCO₂/MWh. Therefore, the 2022 target has been achieved.
- 3 Reduction of GHG emissions from scopes 1 and 2 by 69.4%, with 2021 as the base year and 2030 as the target year.
- 4 Reduction of scope 3 GHG emissions by 42%, with 2021 as the base year and 2030 as the target year.

Other targets that impact scopes 1 and 2 and contribute to the above goals correspond to:

- 1 Expand annual renewable energy sources from 0% in 2021 to 100% by 2024
- 2 Reduction of 65% of the intensity (percentage of actual loss of SF₆/total installed mass of SF₆) of losses of sulfur hexafluoride (SF₆) with 2019 as the base year and 2027 as the target year. In 2022 the intensity of SF₆ emissions was 0.23% for a target of 0.43%.

In terms of the results achieved so far, Table 6 below summarizes how Cemig has already made progress in relation to its targets, including the initiatives related to their achievement.

Table 6. Summary of Cemig's targets and progress

TARGET	DESCRIPTION	% ACHIEVED	RELATED INITIATIVES
TARGET 1	Reduction in 90% of absolute emissions of Scope 1, 2 and 3 by 2040, considering the base year of 2021, reaching the residual value of 1,015,446.09 tCO ₂ and considering Gasmig's emissions	48%	<ul style="list-style-type: none"> Diversification into renewable sources Maintain the power generation 100% renewable Invest in voluntary compensation projects (plantings) Modernization of electricity distribution and transmission infrastructure Investment in distributed generation
TARGET 2	Reduction of Scope 1, 2 and 3 emissions by 75.8% per MWh by 2030, considering 2021 as the base year (without considering Gasmig emissions)	60,7%	<ul style="list-style-type: none"> Sale of Cemig REC and I-REC certification Investment in leasing of 10 electric vehicles Investment in loss reduction, including: <ul style="list-style-type: none"> Smart meters (new installations and replacements) Regularization of clandestine connections Inspections carry-out
TARGET 3	Reduction of GHG emissions from scopes 1 and 2 by 69.4%, with 2021 as the base year and 2030 as the target year	57%	<ul style="list-style-type: none"> Maintain the power generation 100% renewable Purchase of certified renewable energy Investment in leasing of 10 electric vehicles Investment in loss reduction, including: <ul style="list-style-type: none"> Smart meters (new installations and replacements) Regularization of clandestine connections Inspections carry-out
TARGET 4	Reduction of scope 3 GHG emissions by 42%, with 2021 as the base year and 2030 as the target year	43%	<ul style="list-style-type: none"> Sale of Cemig REC and I-REC certification Energy Efficiency measures Engagement with suppliers (recognition of best practices in ESG)
TARGET 5	Purchase renewable electricity for own consumption from 0% in 2021 to 100% by 2024	86%	<ul style="list-style-type: none"> Action initiated in 2023, with the acquisition of Cemig REC for own energy consumption.
TARGET 6	65% reduction in intensity (percentage of actual loss of SF ₆ /total installed mass of SF ₆) of SF ₆ losses with 2019 as the base year and 2027 as the target year	Percentage of losses in 2022 was 0.23% to a target of 0.43%. There was a 36% reduction in emissions intensity compared to the previous year and 62% compared to the base year 2019.	<ul style="list-style-type: none"> Adoption of best practices for the management of SF₆ emissions, with elaboration, in 2020, of the corporate procedure for SF₆ management Elaboration of the SF₆ inventory and standardization in the SF₆ emission calculations, control of gas replacement, updated catalog in the SAP system of all equipment with SF₆ and the mass installed in the Company Training of the workforce dedicated to the maintenance of this equipment Acquisition of more efficient equipment with lower percentage of SF₆ losses

Source: Cemig.

O5. FINAL CONSIDERATIONS

In this second edition of the TCFD Report, Cemig reinforces the importance of considering the recommendations of the Task Force on Climate-Related Financial Disclosures, which play a key role in advancing climate challenges. By adopting these recommendations, it is possible to obtain a clear and transparent view of climate risks and opportunities under the dimensions of Governance, Business Strategy, Risk Management, and Goals and Metrics, allowing informed and strategic decisions to be made for the Company. In addition, integrating the TCFD's recommendations into the reports demonstrates commitment to sustainability and efforts to mitigate climate change.

The energy sector, in particular, must be fully aware of the burden that global warming imposes on the planet, but also of the potential that its contribution to reducing emissions

represents. To meet this challenge, it is crucial to make a transition to a fair, low-carbon economy. This implies the adoption of renewable, cleaner, and more sustainable energy sources. In addition, sectoral innovation should be pursued, developing technologies and strategies that reduce the carbon footprint and promote the efficient use of resources.

IT IS BECAUSE IT BELIEVES IN THE JOINT CAPACITY TO REVERSE THE CURRENT TRAJECTORY OF EMISSIONS THAT CEMIG LAUNCHES THIS REPORT

Another fundamental aspect is the promotion of better consumption habits among employees, suppliers, and customers. By adopting sustainable practices in operations and encouraging awareness of the environmental impact of individual choices, it is possible to contribute to the construction of a more responsible society committed to the preservation of the environment and climate. The transition is not trivial, it requires a collective and integrated approach, and involving all stakeholders is key to achieving meaningful results in the fight against climate change.

It is because it believes in the joint capacity to reverse the current trajectory of emissions that Cemig launches this report, confident that the transparency of performance in the climate field – and at the intersection of financial and non-financial information – is a key piece for companies to connect strategy, actions, and investments in favor of a low-carbon economy.



STRATEGY

+



ACTIONS

+



INVESTMENTS



LOW CARBON

O6. REFERÊNCIAS

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Because our **impact** matters