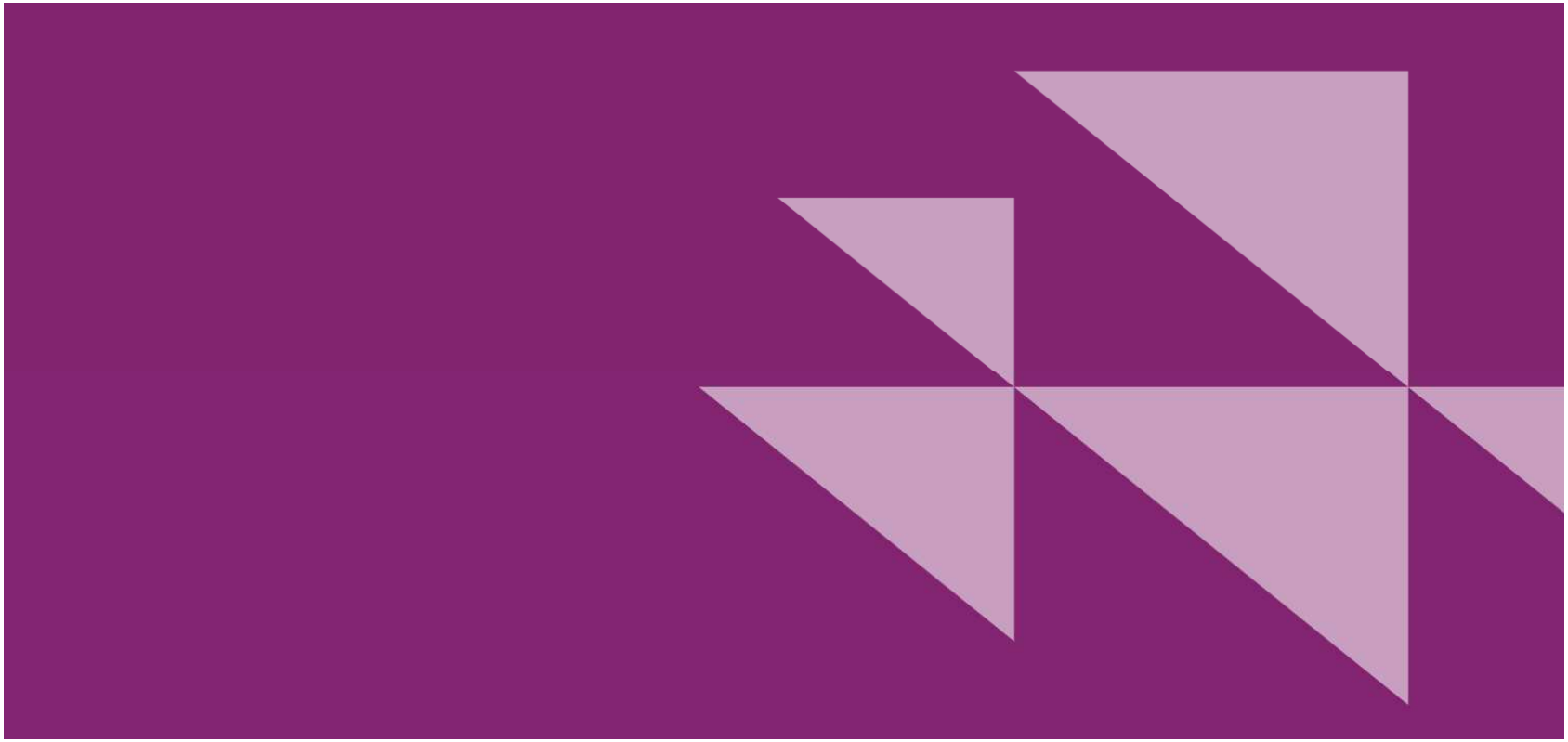
CDP Climate Change 2019 Questionnaire



C0. Introduction

C0.1

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

Founded in 1952 by the then-governor of Minas Gerais, Juscelino Kubitschek de Oliveira, Companhia Energética de Minas Gerais (Cemig) operates in the areas of generation, transmission, trading and distribution of electricity, energy solutions (Efficientia S.A.) and natural gas distribution (Gasmig). The group consists of the holding, Companhia Energética de Minas Gerais (Cemig), wholly owned subsidiaries Cemig Geração e Transmissão SA (Cemig GT) and Cemig Distribuição SA (Cemig D), totaling 173 Companies, 15 Consortiums and two FIPs (Investment Funds in Shares), resulting in assets present in 22 Brazilian states and the Federal District. Since its foundation, the Company has assumed the role of bringing collective welfare to the regions where it operates, in an innovative and sustainable manner. This determination led the company to become the largest power distributor in line and grid extension and to be one of the largest power generation and transmission companies in the country. In addition to the generation, transmission and distribution of electricity, Cemig also operates in the natural gas marketing and distribution segment through Gasmig, which is the exclusive distributor of piped natural gas throughout the state of Minas Gerais. In addition, the Company holds a direct (26.06%) and indirect (23.93%) interest in the capital of Light SA, in which it holds a controlling interest, and also holds a 21.68% interest in Transmissora's capital. Aliança de Energia Elétrica SA - Taesa, giving it control of the company.

Cemig is a publicly-held company, controlled by the Minas Gerais State Government (51%), and its shares are traded in São Paulo, on B3 SA (Brazil, Bolsa, Balcão), in New York, on the New York Stock Exchange (NYSE), and Madrid, in the Latin American Stock Market (Latibex). The Company's consolidated net operating revenues reached R $ 22.27 billion in 2018, based on a matrix whose main source of energy is renewable resources.

Cemig's generation park has an installed capacity of 6,068 MW, of which 96.6% refers to hydraulic generation; 2.2% to thermal generation; 1.2% to wind generation; and 0.02% to solar generation. The Company has 4,930 km of transmission lines. In the area of electricity distribution, it is responsible for managing the largest electricity distribution network in Latin America, with over 536,000 km of extension. At the end of 2018, Cemig had 6,083 employees.

Due to its commitment to the principles of social and environmental responsibility, its economic and financial strength and technical excellence, the Company is internationally recognized as a reference in sustainability in its sector and is positioned as one of the main drivers of consolidation of the Brazilian electricity sector. Cemig has been part of the Dow Jones Sustainability Index (DJSI World) for 19 years, and the Dow Jones Emerging Markets Index (DJSI Emerging Markets) for six years, both since its inception. It also participates, for the 14th consecutive year, in B3's Corporate Sustainability Index (ISE), and was selected for the 9th time to compose the Carbon Efficient Index (ICO2), created in 2010 by B3 and BNDES.

In 2018, Cemig was listed among the leading companies in climate change management and water security in Latin America, by the Climate Change and Water Security Programs, for the quality of information disclosed to investors and the global market. Recognition was granted by CDP Latin America. This is the seventh consecutive year that CDP awards the Company. The selection took into account the level of detail of responses regarding criteria such as risk management, mitigation commitment and greenhouse gas emission reduction initiatives. The best results indicate a high level of transparency in the disclosure of related information, providing investors with consistent content on climate change management and water security.
Mission: To provide integrated clean energy solutions that are accessible to society in an innovative, sustainable and competitive manner.
Vision: To be among the three best integrated power groups in Brazil in governance, financial health, asset performance and customer satisfaction.

C0.2

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

	Start date	End date	Indicate if you are providing emissions data for past reporting years
Row 1	January 1, 2018	December 31, 2018	No

C0.3

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

Brazil

C0.4

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

BRL

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your consolidation approach to your Scope 1 and Scope 2 greenhouse gas inventory.

Operational control

C-EU0.7

(C-EU0.7) Which part of the electric utilities value chain does your organization operate in? Select all that apply.

Row 1

Electric utilities value chain

Electricity generation

Transmission

Distribution

Other divisions

Gas storage, transmission and distribution

C1. Governance

C1.1

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

Yes

C1.1a

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

Position of individual(s)	Please explain
Other C-Suite Officer	Responsibility for climate-related matters has been assigned to the Vice President, as the superintendencies that deal directly with these matters are under the responsibility of the board he is part of. The Vice President who held the position during 2018 has an executive

Position of individual(s)	Please explain
	background in sustainability and nearly 30 years of experience in corporate governance, strategic planning, market analysis, compliance, safety, health and sustainability. Cemig's management consists of the Board of Directors and the Board of Executive Officers. The members of the Board of Directors, elected by the General Meeting of Shareholders, elect the CEO, the Vice-Chief Executive Officer and appoint the Executive Board. The Vice-President Director's functional duties, defined and approved by the Board of Directors, are to collaborate with the CEO in the exercise of his duties and replace him in case of absence, leave, vacancy, impediment or resignation.

C1.1b

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

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action Reviewing and guiding annual budgets Reviewing and guiding business plans Setting performance objectives Overseeing major capital expenditures, acquisitions and divestitures	Review and guidance on strategy and business plans - Cemig has a Corporate Governance and Sustainability Committee, in which economic, environmental and Social issues are discussed and considered by senior management, including issues related to climate change. In formulating its strategy, Cemig considers the principles contained in the document "Commitment to Climate Change", which contains the Company's guidelines for action on the subject. In 2018, the Board of Executive Officers presented the Company's new strategic plan to the Board of Directors, which in turn approved the document in November. The new planning, consisting of the Long-Term Strategy (2019-2040) and the Multi-annual Business Plan (2019-2025), follows a purposeful goal model and has as one of its long-term strategic guidelines the achievement of a high degree. in the national and international governance and sustainability rankings, which includes a leading position on climate issues. Review and orientation of the main action plans - As a strategy deployment, actions that require Board approval or action are discussed at these meetings and are always guided by the

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
		guidelines contained in the document “Commitment to Climate Change”, given the scope of the climate change objectives and targets. Annual Budget Review and Guidance - The Board considers the budgetary needs for the implementation of action plans that ensure the effective implementation of the climate change strategy - objectives, goals and programs - and promotes its regular follow-up. Definition of performance objectives - The Company has business monitoring and evaluation indicators, including indicators of power supply interruptions. In Cemig's case, these indicators are strongly climate related, as the physical structure and capacity of hydroelectric power generation are exposed to climate risks. Supervision of main capital expenditures, acquisitions and disposals - According to the Company's Bylaws, the Board of Directors is responsible for approving the Annual Budgets and resolving, by proposal of the Executive Board, on investment projects, disposal of assets, among others. In 2018, the Board approved the creation of Cemig GD to diversify the Company's energy matrix and a BRL 40M investment in innovation projects to boost Cemig's Strategic Innovation and Digital Technology Plan, called CEMIG 4.0. This plan unfolds on the axes of digitization (user experience and data intelligence), decarbonization (electric vehicles and renewable energy) and decentralization (distributed generation and energy storage).

C1.2

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

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues

Other C-Suite Officer, please specify Executive Vice President	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly
Other, please specify Superintendent of strategy planning and management	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly

C1.2a

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

The Strategy Planning and Management Superintendent leads the Strategy Planning and Management Superintendence, which is responsible for the management of the Climate Change theme within the Company, and reports directly to the Company's Vice-President, who gives the guidelines and validates the actions related to it. to this theme. The Chief Executive Officer reports directly to the Company's CEO, with the CEO being the highest level of the Executive Board, who, in turn, reports directly to the Board of Directors. This provision grants the necessary autonomy to the area responsible for the management of the theme in the development of Cemig's guidelines and in the interaction with the other areas of the Company that contribute to the management of this theme.

Within the Superintendence of Planning and Strategy Management, the Corporate Sustainability Management brings together the main responsibilities and responsibilities associated with climate issues. These are:

- Monitor and monitor corporate and institutional changes related to corporate sustainability, climate change and social responsibility and, if necessary, propose changes to the Company's guidelines, drivers, indicators, goals and strategic initiatives;
- Assist in proposing and approving technical standards and normative instructions necessary for the development of corporate sustainability, climate change and social responsibility, aligned with strategic drivers and sector regulation;
- Conduct and enable studies on climate risk assessment in the Company's activities, as well as identify opportunities related to climate change.
- Analyze and elaborate projects related to greenhouse gas emissions, to comply with legislation and corporate sustainability requirements.
- Analyze and prospect trends, risks and opportunities in the area of climate adaptation and mitigation through research and engineering studies of national and international best practices.
- Work on the development and structuring of corporate policies, guidelines and procedures related to climate adaptation and mitigation in partnership with related areas and aligned with the Company's guidelines, drivers, indicators, goals and initiatives.

- Provide inputs to strategic planning on climate change and propose strategic drivers on climate change, as well as accompany global and local discussion of climate change issues such as regulatory frameworks, formal and voluntary emissions trading, carbon pricing, taxation, among others.
- To quantify Cemig's greenhouse gas emissions and projects developed by the Company (energy efficiency, fuel / energy substitution, carbon reduction projects, transmission and distribution energy losses and others) and provide information on emissions from the energy acquired by Cemig's medium and large customers.

It is noteworthy that all the attributions of the Strategy Planning and Management Department related to the environment include the issues related to climate change.

The Strategy Planning and Management Superintendence surveys and assesses Cemig's risks and opportunities in the face of climate change, as well as the respective monitoring of these risks and opportunities, always acting in conjunction with the Rich Management Area and other related areas in all areas. the phases of the process through the integrated approach that guides Cemig's risk management. For example, energy efficiency initiatives are under the responsibility of the Energy Efficiency Management, energy loss reduction initiatives are coordinated by the Measurement and Commercial Loss Management and Control, the GHG emission reduction strategy. and goal setting are under the command of the Strategy Planning and Management Superintendence in partnership with the areas involved, actions related to meteorology, energy planning and water management are under the responsibility of the Energy Planning and Water Resources Management, the process of Risk management is coordinated by the Corporate Risk Management.

The Company does not yet have a systematic process for monitoring climate change issues, each project / area having its own practices / routines. The monitoring of weather indicators, for example, is done weekly, when the responsible team meets to analyze the weather forecast of the week and measure their possible impacts on operations. From this assessment, it is possible to mobilize repair teams in the electrical system to respond more quickly to system occurrences in order to reduce the time consumers remain without the power supply.

C1.3

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

Yes

C1.3a

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

Who is entitled to benefit from these incentives?

Corporate executive team

Types of incentives

Monetary reward

Activity incentivized

Efficiency target

Comment

Indicator: Electricity loss rate.

Energy losses in the electrical system account for 99.4% of Cemig's Scope 2 emissions. In order to make the objective of reducing these losses and Scope 2 emissions measurable, the Total Distribution Loss Index (IPTD) was implemented, with multiannual targets validated annually and monitored monthly. Control of losses is one of Cemig's strategic objectives, since these losses represent unearned revenues and, indirectly, have environmental impacts such as increased GHG emissions. This loss ratio is linked to the variable compensation of all of the Company employees.

Indicator: quality of electricity supply.

The DEC (Equivalent Interruption Duration per Consumer Unit) and FEC (Equivalent Interruption Frequency per Consumer Unit) indicators are tools that contribute to the assessment of the effectiveness of actions and initiatives to meet the standards required by the regulator and expected by customers. Since most power outages are caused by trees, windstorms, and lightning, which can damage installations that carry and distribute energy, many of the DEC and FEC indicator control initiatives are directly related to climate change. Regarding the remediation of impacts caused by trees, the Company prepares for more severe climatic events, when the degree of risk presented by the vegetation is high. These indicators are linked to the variable compensation of all of the Company employees.

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Monetary reward

Activity incentivized

Efficiency target

Comment

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Who is entitled to benefit from these incentives?

All employees

Types of incentives

Recognition (non-monetary)

Activity incentivized

Efficiency project

Comment

In 2017 Cemig promoted the Ideo Illuminated Competition, which aimed to promote solutions aimed at reducing fuel consumption, energy efficiency, water efficiency and reducing the generation of waste. Of the 44 projects submitted by Cemig employees, four were selected and the

first to be implemented was a rainwater harvesting system for the Company's main building in the Vila Mariana neighbourhood of Governador Valadares. The project was opened in December 2018 and its results were published in an internal company publication as a way of recognizing the work done.

Who is entitled to benefit from these incentives?

Other, please specify

Superintendence of strategy planning and management team

Types of incentives

Other non-monetary reward

Activity incentivized

Other, please specify

Sustainability Index Performance

Comment

Each year, following the release of the new Dow Jones Sustainability Index portfolio, the Strategy Planning and Management Superintendence team is presented with a celebration lunch. This luncheon is presented as a reward for maintaining Cemig in the index, reaffirming the Company's leadership position on climate change.

C2. Risks and opportunities

C2.1

(C2.1) Describe what your organization considers to be short-, medium- and long-term horizons.

	From (years)	To (years)	Comment
Short-term	0	2	This timeframe is in line with the annual review period of the Company's Long Term Strategy, Multiannual Business Plan and Annual Budget. Annually, also, the administrators and the members of the committees must submit a performance evaluation regarding the exposure of the management acts practiced, contribution to the results of the exercise and achievement of the objectives established in the Multiannual Business Plan and compliance with the Long Strategy. Deadline and Annual Budget.
Medium-term	2	10	This time horizon is in line with the period covered by the Company's Multiannual Business Plan, which reflects the assumptions of the Long Term Strategy and contains the five-year goals, including the Annual Budget. 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.
Long-term	10	30	This time horizon is in line with the period covered by the Company's Long Term Strategy (2019-2040). The Long Term Strategy contains fundamentals, goals, objectives and results to be pursued and achieved in the long term by the Company.

C2.2

(C2.2) Select the option that best describes how your organization's processes for identifying, assessing, and managing climate-related issues are integrated into your overall risk management.

Integrated into multi-disciplinary company-wide risk identification, assessment, and management processes

C2.2a

(C2.2a) Select the options that best describe your organization's frequency and time horizon for identifying and assessing climate-related risks.

	Frequency of monitoring	How far into the future are risks considered?	Comment
Row 1	Six-monthly or more frequently	>6 years	Corporate risk management is an integral process of Cemig's Corporate Governance practices, whose relevant activity is the mapping of events that may interfere with the company's strategic objectives. This

	Frequency of monitoring	How far into the future are risks considered?	Comment
			process allows the mapping and assessment of processes / operational risks, prioritized by the Corporate Risks Monitoring Committee, while the Executive Board and Board of Directors, prioritize the Top Risks. Risks classified as Top Risks are related to the Company's objectives and vision or strategic drivers. Process / operational risks arise in the exercise of business functions and are associated with people, systems and processes. As of 2019, risks were also classified according to their nature, one of them being Socioenvironmental: Associated with disability or inadequate environmental and social management, impacting the environment and society. It also contemplates the potential effects of climate change on business, which may make new enterprises unfeasible.

C2.2b

(C2.2b) Provide further details on your organization's process(es) for identifying and assessing climate-related risks.

The Corporate Risk and Compliance Management Superintendence is responsible for providing methodology for risk identification and assessment, including those related to climate change, conducting this process in an integrated manner to areas related to those risks and / or taking responsibility for related actions, prevention, mitigation and monitoring of these identified risks.

When a risk is first mapped to Cemig, the Company's corporate methodology directs the following steps to be followed: identification - which corresponds to understanding the scope, causes and impacts of the risk; quantification - where the probability of occurrence is estimated, and the possible impacts, should that risk materialize; treatment - which is the survey of all actions and controls that act to mitigate that risk, as well as the mitigating effect of these actions on mapped impacts; and monitoring - which consists of inserting risk into the corporate tool, managing self-assessments of mitigation controls and initiatives, and validating risk with its holder. When there is a need to review a risk that has already been mapped, all information is updated via the system. With risk mapping, a report is generated containing the main information about that risk, the Risk Report, if it is a Top Risk.

The Strategy Planning and Management area is responsible for identifying the risks related to climate change. This identification occurs through the mapping of events that may interfere with the achievement of the strategic objectives defined by the Company.

In the identification and quantification of risks, Cemig considers as a measure of substantial financial impact losses above 1% in the Company's net operating revenue. This metric is valid throughout the Company.

C2.2c

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

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	Regulatory Changes: Through its National Policy on Climate Change, the Brazilian government has set a voluntary target of reducing between 36.1% and 38.9% of Brazilian GHG emissions, 2020. The Brazilian government ratified the Paris agreement in 2016 and made a commitment through a Nationally Determined Contribution (NDC) to reduce greenhouse gas emissions by 37% below 2005 levels by 2025, with a subsequent indicative contribution to reducing greenhouse gas emissions by 43% below 2005 levels by 2030. The Company considers the increase in operating cost to be the main potential impact of this risk. This risk may materialize in the medium term at the Igarapé Thermal Power Plant, as it uses fuel oil. Cemig seeks to implement measures to mitigate this impact by seeking opportunities to expand power generation from low carbon renewable sources. Another way to mitigate this risk is through participation in industry associations with the Brazilian Business Council for Sustainable Development (CEBDS), which promotes discussions on the risks associated with new regulations in Brazil. Other regulatory risks: In order to propose measures to boost energy efficiency in the country, the Ministry of Mines and Energy published the National Energy Efficiency Plan (PNEf). The PNEf adopts the target of 10% reduction in electricity consumption for the year 2030, related to the consumption scenario, based on 2004. This could cause a reduction in Cemig's supply of electricity to its consumers, influencing the business. from the company. The Company's action to mitigate this risk is by participating in legal discussion forums, both at the federal and state and municipal levels. Additionally, it promotes Energy Efficiency Programs, both residential and industrial.
Emerging regulation	Relevant, always included	Carbon Taxation: Cemig practices a low carbon energy matrix, but operates a fossil fuel-fired thermal power plant, which may have its operations impacted in the event of carbon taxation in Brazil. As a measure to mitigate this risk, the Company promotes scope 1 emission reduction measures, as it believes that the tax would be levied on these emissions. These expenses would represent R $ 14.643 million per year (in the worst case scenario).

	Relevance & inclusion	Please explain
Technology	Relevant, always included	Cemig invests in Technology and Innovation, always seeking to continuously improve its processes, reduce its emissions and prepare for the effects of climate change - considering energy alternatives and energy efficiency. The company may have its business impacted by new technologies in the medium and long term such as revenue and customer loss if it does not develop strategic partnerships or is unable to implement technological changes in its services. The company has defined the medium and long term strategic initiative to explore new technologies and opportunities such as smartgrid, hybrid generation, energy storage, “electro stations”, digitization, among others, aiming to mitigate this risk and leverage opportunities. In order to make this strategic initiative possible, Cemig launched the Cemig 4.0 program with three strategic drivers: digitization, decarbonization and decentralization. In 2018, Cemig invested around R $ 40 million in two R&D projects.
Legal	Not relevant, included	Legal risks related to climate change were included in the scope of the corporate assessment of climate change risks and were considered not relevant, since in Brazil there is no specific applicable legislation and Cemig has only one thermal plant. (Igarapé TPP). In addition, the company is evaluating less polluting options for this asset, such as conversion to natural gas. It is noteworthy that the Igarapé TPP concession expires in August / 2024.
Market	Relevant, always included	Cap-and-trade schemes: The establishment of a cap-and-rade GHG emissions trading market in Brazil may require Cemig's plan for compliance with market-specific regulations, particularly regarding monitoring and verification of emissions. To mitigate this risk, Cemig seeks to identify carbon-generating projects and long-term contracts with verifying and certifying companies, thereby reducing the likelihood of materializing this risk for the Company. In addition, when assessing the acquisition of fossil fuel ventures, Cemig conducts internal analyzes of the carbon risk and its financial impact on the Company, ie the financial risk of the venture in a possible future scenario of pricing of carbon emissions. GHG in Brazil. Another way to mitigate this risk is by participating in the Emissions Trading System Simulation project, an initiative of the Center for Sustainability Studies, GVces, the São Paulo Business School, the Getúlio Vargas Foundation (EAESP / FGV). The company estimates that it could be impacted in the medium and long term.
Reputation	Relevant, always included	Reputation: Should Cemig need to expand its energy supply through fossil fuel-fired thermal plants, it may be criticized by society, impacting on brand value. This impact may be even greater if the increase in generation occurs through fossil fuel-fired plants, as it leads to a worsening of Cemig's sustainability indicators, leading to a reduction in the company's score in questionnaires such as the

	Relevance & inclusion	Please explain
		ISE B3 Corporate Sustainability) and the DJSI (Dow Jones Sustainability Index). In an extreme case, this risk could lead to Cemig not being included in the portfolios of these sustainability indices in a given year, resulting in a drop in market value and a deterioration in the company's reputation with investors.
Acute physical	Relevant, always included	Heavy rainfall over a short period of time, accompanied by windstorms and lightning, can cause physical damage to facilities that transport and distribute energy, leading to unavailability and increased Cemig costs. reimbursement to consumers as a result of power outages (DEC and FEC indicators). These phenomena are increasingly associated with the effects of an unfavorable microclimate typical of large urban centers. Management methods seek to reduce the magnitude of this risk in the medium term through preventive adaptation measures, such as the management of urban afforestation by pruning, the operation of weather stations and the weather radar, which more accurately predicts the occurrence and storm intensity, and the emergency plan with the allocation of maintenance teams for the rapid restoration of power supply. In addition, Cemig also promotes works in its distribution system (expansion, reinforcement, refurbishment and renovation of assets such as substations and distribution lines) and force in its distribution system. For the new five-year investment cycle, which covers the period from 2018 to 2022, R $ 4.5 billion in investment funds were approved, distributed among the different macro projects. In 2018, the Company made an amount of approximately R $ 825.5 million in cash (products and services) out of an approved total of R $ 1.052 billion for this year.
Chronic physical	Relevant, always included	Change in Rainfall Pattern: Climate change can cause changes in seasonal rainfall patterns, with more pronounced extreme rain and drought events, and changes in their geographic distribution. In addition, the average rainfall may change, changing the amount of water that reaches the reservoirs of the plants. As Cemig's electricity production is basically hydraulic, these changes may lead to reduced generation capacity. The company was impacted in the last 05 years by water scarcity, the actions taken to mitigate this risk were: expansion of its operations to other regions of the country, with watersheds of greater water availability, feasibility analysis of investments considering the criteria related to availability. hydrometeorological network maintenance and operation and investments in other energy sources such as solar. Changes in Average Temperature: Climate change may cause average temperatures to rise and changes in rainfall and drought regimes and, indirectly, potentially increase some risks to the Power Transmission System, as prolonged drought conditions maximize the risk of fire. Fires within or around the right of way can cause transmission lines to become

	Relevance & inclusion	Please explain
		unavailable. To mitigate this risk, Cemig continually inspects and cleans the transmission line's servitude bands to maximize safety and availability of transmission functions (always limited to minimal vegetation removal, avoiding mowing where no interference occurs). with the transmission lines). Changes in precipitation and drought extremes: Heavy rainfall over a short period of time, accompanied by windstorms and lightning, can cause physical damage to facilities that transport and distribute energy, leading to unavailability and increased costs for Cemig reimbursement to consumers as a result of power outages. These phenomena are increasingly associated with the effects of an unfavorable microclimate typical of large urban centers. Management methods seek to reduce the magnitude of this risk in the medium term through preventive adaptation measures, such as the management of urban afforestation by pruning, the operation of weather stations and the weather radar, which more accurately predicts the occurrence and storm intensity, and the emergency plan with the allocation of maintenance teams for the rapid restoration of power supply.
Upstream	Relevant, always included	Cemig has a wide supply chain and is therefore not dependent on a single geographic region or a single type of supplier. In addition, the company uses sustainability criteria to classify suppliers, taking into account social, environmental, contract value and type of service variables. As a medium-term strategy to mitigate this risk, the company is developing intelligent supply chain management R&D, with a two-year completion term. For this reason, the Company considers that this risk is not relevant. If the contractors' facilities or equipment are damaged by extreme weather events, it is estimated that the company may be impacted, as it may interrupt the distribution network maintenance service (performed by third parties).
Downstream	Relevant, always included	Change Consumer behavior: High temperatures may cause increased electricity consumption and overload the electricity distribution system in more critical regions of the state of Minas Gerais, which may cause lower availability of energy supply to consumers in these regions. This risk, which is expected to occur over the long term, is managed by conducting the diagnosis of the electrical system for the need for expansion works; monitoring of operating conditions; and the reprioritizing of the works.

C2.2d

(C2.2d) Describe your process(es) for managing climate-related risks and opportunities.

Corporate risk management is an integral process of Cemig's Corporate Governance practices, whose relevant activity is the mapping of events that may interfere with the achievement of the Company's strategic objectives, the so-called Top Risks. The modeling and analysis of operations from the point of view of risk management aim to optimize investments to control activities, reduce costs and losses, improve performance and, consequently, favor the achievement of goals set by the Company.

The Company has risk management software, SAP RM (Risk Management), which enables the risk mapping process to be carried out continuously as information and checks and assessments of controls and plans are updated. are informed by the holders of each activity within the system.

In 2018, the mapping of the Top Risks was guided by themes prioritized by the Corporate Risk Monitoring Committee - CMRC and validated by the Executive Board and Board of Directors, covering the Holding, Distribution, Generation, Transmission and Trading businesses and registered in SAP RM. Among the mapped risks are also those of socio-environmental nature, linked to climate change. The reporting of the Top Risks to the Board of Executive Officers and the Board of Directors, as well as the CMRC's handling recommendations for each case, are made continuously and rigorously as approved by the Committee. Specifically, the physical risk related to water scarcity and its impact on power generation by hydrologic source follows this ritual.

The Company's current risk management policy is a public document that guides not only Cemig D and Cemig GT but also all wholly owned subsidiaries, and is approved by the Board of Directors. This policy also sets out the risk appetite to be followed, is guided by principles that translate best market practices and, in particular, is aligned with the governance model called “Three Lines of Defense”.

The “Three Lines of Defense” model is a simple and effective way to improve risk management communication and internal controls by clarifying key roles and responsibilities, helping to ensure the continued success of risk management initiatives.

The company's opportunity management begins in the five-year review cycles of strategic planning, when strategic directions regarding the opportunities to be exploited by the company are defined in the coming years. After defining the lines of action, the business areas are tasked with developing the opportunities and follow-up is done at executive board meetings. Among the opportunities to be seized, the entry into the distributed generation business through the formation of the wholly-owned subsidiary Cemig Geração Distribuída SA - Cemig GD stands out. The company came up expecting that in the next two years 250 MW of installations will be realized. Additionally, in 2018, Cemig's R&D program was restructured based on Cemig's Strategic Digital Technology Innovation Plan, giving rise to the Cemig 4.0 Program. The program aims to position the Company among companies in the sector capable of responding to new trends and global demands on energy systems. It is through this program that Cemig should explore the opportunities and challenges of the new business models in the segment. Following a strategy based on digitization, decarbonization and decentralization, topics such as electric mobility, renewable energy, user experience, data intelligence, distributed generation, energy storage, cybersecurity strategy, new business models and talent for the digital age are the focus of Cemig 4.0 projects.

Entering into the distributed generation business and creating the Cemig 4.0 Program are examples of transition opportunities for a low carbon economy and an energy efficient economic system.

C2.3

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

Yes

C2.3a

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

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Chronic: Changes in precipitation patterns and extreme variability in weather patterns

Type of financial impact

Other, please specify

Cashflow mismatch of Cemig D due to the increase in energy purchase prices

Company- specific description

Contracts of energy purchase held by CEMIG D have their prices linked to certain variables that cannot be controlled, such as hydrological conditions and the dispatch of the Igarapé thermal plant. Although any increase in energy purchase costs due to adverse hydrological conditions

and the dispatch of the power plant Igarapé thermal higher-than-expected are passed on to Cemig D during its tariff adjustments, such a situation may lead to cash flow mismatch, with an impact adverse effect on CEMIG's financial conditions.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

333,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Due to the increase in energy purchase prices due to hydrological conditions, this may lead to a mismatch in Cemig D's cash flow. As of January 2015, Aneel implemented the Tariff Flags system. This system increases the end customer tariff when the generator system goes through adverse hydrological conditions, transferring part of the costs to these customers more quickly. Even with this mechanism in place, there is a risk that the increase in energy purchase prices will be so high that the Company's cash will be pressured until the next tariff adjustment. The recovery of higher energy purchase costs through tariff transfer occurs gradually over the twelve months between readjustments. This reported impact represents Cemig D's cash flow deficit as of December 2018.

Management method

Cemig has a specific organizational structure, fully dedicated to the management of energy purchase and sale. It has the Energy Risk Management Committee (CGRE), with the objective of minimizing the risks in the purchase and sale of energy contracts, as well as mitigating the risk of short term exposure due to bad hydrological conditions.
In 2018, the mapping of Top Risks continued to be guided by themes that were prioritized by the CMRC and validated by both the Board of Directors and the Board of Directors.
The Management Cost is calculated based on the staff costs of the fare team. Cemig has seven employees in the fare team and the cost of the company with each employee is R $ 220,000.00. Thus, the management cost was obtained by the calculation: 7 x R $ 220,000.00 = R $ 1,540,000.00.

Cost of management

1,540,000

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Acute: Increased severity of extreme weather events such as cyclones and floods

Type of financial impact

Increased operating costs (e.g., higher compliance costs, increased insurance premiums)

Company- specific description

Heavy rainfall over a short period of time, accompanied by windstorms and lightning, can cause physical damage to facilities that transport and distribute energy, leading to their unavailability and increased costs from Cemig, caused by reimbursement to consumers as a result of power outages. In 2018, approximately R $ 46.2 million was paid in compensation to Cemig consumers for violation of individual indicators of continuity of electricity supply. Despite the reductions in the DEC and FEC indicators used to assess the effectiveness of Cemig's actions and initiatives in relation to energy quality, in 2018 the compensation value was 30% higher than in 2017.
These phenomena are increasingly associated with the effects of an unfavorable microclimate, typical of large urban centers.
This type of event can lead to the rise of indicators that measure the quality of the power supply.
Cemig D's concession contract requires the fulfillment of efficiency criteria related to the continuity of supply and the economic and financial management to maintain the concession, respecting the right to broad defense and contravention in case of non-compliance, considering that: (i) for a period of five years from January 1, 2016, any breach for two consecutive years, or any of the conditions at the end of the five-year period, will lead to the termination of the concession; (ii) from January 1, 2021, possible non-compliance for three consecutive years to the efficiency criteria in the continuity of supply.

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

46,200,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Increase in operating costs, Compensation costs (Aneel penalty) due to breach of indicators system continuity (DEC, FEC and DMIC indicators), Indemnity cost (lost profit, lost production, equipment burns, etc.), Tariff losses due to Q Factor X component, Negative image / brand exposure Cemig and customer dissatisfaction, Assessments referring to quality indicators due to increased exposure of the company to the supervisory body.

Management method

Management methods seek to reduce the magnitude of this risk in the medium term through preventive adaptation measures, such as the management of urban afforestation by pruning, the operation of weather stations and the weather radar, which more accurately predicts the occurrence and storm intensity, and the emergency plan with the allocation of maintenance teams for the rapid restoration of power supply. In addition, Cemig carries out the Distribution Development Plan - PDD, which consists of undertaking projects related to the electric power system, associated with the expansion, reinforcement, renovation, and renewal of Cemig D assets, such as substations and distribution lines. In 2018, R $ 825.5 million was invested in PDD investments out of an approved total of R $ 1.052 billion approved for the year.
Management costs are not solely to mitigate this risk, but also to seek to increase the energy supply to customers.
In order to calculate the management cost, investments in expansion and reinforcement in high voltage, reform of the high voltage system, reinforcement of medium and low voltage networks, reform of medium and low voltage resets were considered, which is equivalent to 15% of the total. total invested in 2018, which was 825.5 million.

Cost of management

130,933,000

Comment

Cemig D defines, through the Distribution Development Plan - “PDD”, the prioritization of the investments to be made by the Distributor, referring to the BRR - Regulatory Remuneration Basis, - and the respective prudent management. resources in the current tariff cycle, with the objective of continuously increasing the availability of electricity, with quality, safety and the quantity required by customers, promoting social and economic development in Cemig's concession area.

Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Transition risk

Primary climate-related risk driver

Policy and legal: Other

Type of financial impact

Increased operating costs (e.g., higher compliance costs, increased insurance premiums)

Company- specific description

Despite having a low carbon energy matrix, Cemig operates the fossil fuel-powered Igarapé thermal power plant (131 MW installed capacity), which could have its operations impacted in the case of carbon taxation in Brazil. This taxation also poses a risk if Cemig plans to expand its electricity generation business through fossil fuel thermal plants in the future.

Time horizon

Medium-term

Likelihood

About as likely as not

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

14,728,643.75

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Data coverage provided for risks arising from changes in legislation covers the business area of the Generation since in the event of the occurrence of emission taxation this will probably, exclusively in thermal plants, not affecting other business of the Company. Cemig currently has only 1 thermal power plant with an installed capacity of 131 MW, representing 2.2% of the total installed capacity and operates only when there is a need to meet contingencies of the Brazilian Interconnected Electric System.

To calculate the potential financial impact, a tribute estimate of US $ 6.54 / tCO2e was used, considering the US dollar exchange rate at R $ 3.90 and the largest issuance and largest issuance of the Igarapé TPP in recent years (which occurred in 2014): 577,458 tCO2e.

Management method

Cemig assesses carbon risk in due diligence operations, accounts for corporate GHG emissions through the Company's emissions inventory, and establishes GHG emission reduction targets.

To assess the acquisition of fossil fuel ventures, Cemig conducts internal analysis of the carbon risk and its financial impact on the Company, i.e. the financial risk of the venture in a possible future scenario of pricing of carbon emissions in Brazil. To calculate the financial impact of carbon pricing on these assessed projects, the energy to be generated and GHG emissions were calculated, considering each scenario, and GHG emissions were multiplied by the internal carbon price. The results were included in the project's financial feasibility analysis and incorporated as operating costs. The value used in carbon pricing in projects to be potentially acquired using fuels is 6.54 US$ / tCO2 (internal price adopted by Cemig, based on carbon price values that considers the following parameters: (i) geographic location, based on prices in countries of the same region of Brazil (Latin America) and (ii) sectoral parameter, based on the prices charged by companies in the same sector of Cemig.

With these actions, we expect a reduction in the magnitude of the risk of taxation for the Company, when the new regulations are implemented. Costs are annual and are associated with maintaining the environmental team of Igarapé Thermal Power Plant and the execution of the Company emission inventories.

Cost of management

450,000

Comment

The costs will exist as long as the risk.

Identifier

Risk 4

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Chronic: Rising mean temperatures

Type of financial impact

Other, please specify

Power supply interruption

Company- specific description

Climate change may cause increased average temperatures and changes in rainfall and drought regimes and, indirectly, may increase some risks to the Power Transmission System, as prolonged drought conditions maximize the risk of fire.
Fires within the pipeline or its vicinities may cause unavailability in transmission lines. Cemig's areas of operation that could suffer greater impact would be Triângulo Mineiro and the metropolitan regions in the state of Minas Gerais.

Time horizon

Medium-term

Likelihood

About as likely as not

Magnitude of impact

Low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1,186,644.84

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Aneel Normative Resolution No. 729/16, which establishes the provisions regarding the quality of the public electricity transmission service, associated with the availability and operating capacity of the facilities, establishes discounts. by variable portion caused by fires that cause shutdowns in Transmission Lines.

In 2018, the amount of R$2,636.95 was discounted referring to discounts for variable installment caused by fires that cause shutdowns in Transmission Lines.

There is a defense of 01 discount related to 2018 from ONS - National System Operator, in the amount of R$1,184,007.89, which has not been paid because it is waiting for a response to the appeal.

Management method

Cemig continually inspects and cleans the easement strips (limited to minimal vegetation removal, avoiding mowing where transmission lines will not interfere) with its transmission lines to maximize safety and availability of transmission functions. In 2018, for example, easements were cleared over a total area of 33,139,405 m² along Cemig's structures and transmission lines.

In addition, it creates firebreaks at the foot of the towers and applies flame-retardant paint to wood posts in hazardous locations.

Cost of management

3,962,588

Comment

Management costs are annual and are associated with the process of cleaning the right of way along with the structures and transmission lines. The management cost is greater than the financial impact because it refers to the maintenance of Cemig's entire transmission system. The reported financial impact refers only to the disconnection of one line from Cemig's various lines.

C2.4

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

Yes

C2.4a

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

Identifier

Opp1

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Other

Type of financial impact

Increased revenue through new solutions to adaptation needs (e.g., insurance risk transfer products and services)

Company-specific description

Compliance with regulatory requirements and the emergence of new international agreements can create opportunities for Cemig, as the Company, by Having a predominantly renewable energy matrix (2018 installed capacity: 95.97% hydraulic and 1.90% between wind and solar) and with low carbon emissions, is better prepared than its competitors to adapt to this scenario. The establishment of a cap-and-trade trading market in Brazil or internationally, along the lines of the CDM, for example, could lead Cemig to position itself as an important supplier of emission reduction certificates. This opportunity could lead to increased revenue at Cemig.

Time horizon

Long-term

Likelihood

Very likely

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

468,381.96

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Cemig has 306,132 credits issued under the CDM. The financial impact was calculated based on the possibility of these credits being traded at EUR 0.34 per credit (maximum price in 2018), considering the euro quotation at R$3.80.

Strategy to realize opportunity

Cemig has professionals trained in identifying carbon-generating projects and has long-term contracts with verifying and certifying companies, thus increasing the possibility of taking advantage of this opportunity. Cemig already has emissions reduction CDM projects registered with UNFCCC.

In 2018, these projects were monitored (306,132 carbon credits) and properly monitored according to registered PDDs. The associated costs are those related to the monitoring and audits necessary for the validation and commercialization of credits generated by three Cemig projects (Baguari HPP, Cachoeirão SHP, and Santo Antônio HPP).

Cost to realize opportunity

280,842

Comment

The costs are not annual and will occur when the audits are performed.

Identifier

Opp2

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Markets

Primary climate-related opportunity driver

Other

Type of financial impact

Other, please specify

Revenue increase

Company-specific description

The likely rise in average temperatures will lead to changes in consumption patterns, such as increased use of ventilation and cooling systems, resulting in increased demand for energy. A study conducted by Rodrigues et al. (2013) evaluated the possible impact of climate change on residential electricity demand, based on projections of average quarterly temperature increase according to the scenario of GHG emissions from the 4th IPCC Report. The results suggest that residential electricity demand in Brazil may increase in response to the projected rise in temperature. Considering that Cemig has more than 6.8 million residential consumers in the state of Minas Gerais, taking advantage of this opportunity will bring a substantial increase in the Company's revenue.

Time horizon

Medium-term

Likelihood

About as likely as not

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1,698,080,674.8

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

According to this study, the increase in residential energy demand will be approximately 27% by 2050. Considering that Cemig's sale to residential customers was 10,266 GWh in 2018, with the increase the additional sale will be 2,702.43 GWh and using the average current tariff of R$0.62833 / kWh (Normal Residential Rate 2019), the possible financial impact was calculated.

Strategy to realize opportunity

In order to prepare for the increase in energy demand, Cemig has been expanding the availability of electricity distribution infrastructure to meet the growth of this market, through reinforcement works in substations, lines and distribution networks. These actions contribute to both increasing the likelihood of taking advantage of this opportunity and its magnitude. The investment cycle is five-year, according to sector regulation.

In 2018, under the 2018-2022 cycle, investments were made in the following macro projects:

- Expansion and reinforcement in high voltage;
- Assistance to consumers and accessors (Cemig Participation);
- High voltage system reform;
- Operation and maintenance at high voltage;
- Reinforcement of medium and low voltage networks;
- Service to the urban market in medium and low voltage;
- Service to the rural market in medium and low voltage;
- Complementary Program (Participation of Cemig) in low and high voltage;
- Third-Party Security (Participation of Cemig);
- Network reform in medium and low voltage;
- Operation and Maintenance in medium and low voltage;
- Measurement Exchange / Border Measurement;
- Environment;
- Medium Voltage Automation Master Plan;
- telecommunications; and
- Scada Project.

The value calculated to materialize the opportunity is the sum of all investments approved for the PDD in the 2018-2022 cycle.

Cost to realize opportunity

4,500,000,000

Comment

Cemig Distribuição defines, through the Distribution Development Plan - PDD, the prioritization of the investments to be made by the Distributor, referring to the BRR (Regulatory Remuneration Basis), - and the respective prudent management of the resources in the current tariff cycle,

with the objective increasing the availability of electricity continuously, with quality, safety, and quantity required by customers, promoting social and economic development in Cemig's concession area D.
the PDD is the achievement investments linked to the electric power system, associated with the expansion, reinforcement, renovation and renovation of Cemig D's assets, such as substations and distribution lines.

Identifier

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Other

Type of financial impact

Other, please specify

Revenue increase + delay of investments

Company-specific description

In a scenario of greater corporate investments in energy efficiency, aiming at the reduction of electricity consumption and the consequent reduction of GHG emissions, Cemig's subsidiary Efficientia will have a possible increase in demand for its services, among them the implementation of lighting use projects, using LED technology, cogeneration, distributed generation and other energy solution services. It is worth mentioning that these projects are made with performance contracts in which Efficientia provides the necessary resources and recovers its investment through the savings obtained in the project.
In this context, Efficientia may also have increased demand for its ISO 50001 Energy Management Systems implementation consulting service.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

Low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

10,150,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

The figure represents the estimated revenue for Efficientia with the realization of energy solutions services.

Strategy to realize opportunity

These energy solution projects are managed by the Efficientia team, whose focus is on optimizing project results and adhering to the deadline and costs stipulated in the respective budgets. In addition to enhancing operational efficiency, one of Efficientia's cogeneration projects in Itaúna estimates that it will reduce CO2 emissions by an average of 7557 tons annually. In one of its lighting projects in Belo Horizonte, it expects to reduce 3000 MWh / year by replacing conventional lighting with LED lamps.

Costs are annual and are associated with maintaining Efficientia staff, not including investment costs in energy efficiency projects.

Cost to realize opportunity

6,062,671

Comment

The associated costs will exist whenever this opportunity exists.

C2.5

(C2.5) Describe where and how the identified risks and opportunities have impacted your business.

	Impact	Description
Products and services	Impacted	With power generation being primarily hydraulic, Cemig recognizes that the risks inherent in climate change can lead to reduced generation capacity and a significant impact on the power supply. Thus, Cemig, among other risks, acts preventively by monitoring: - Change in precipitation pattern: To this end, Cemig has a specific organizational structure that supports risk management and decision-making in both marketing and distribution. operation of the assets. Cemig also participates in the Energy Reallocation Mechanism (MRE), whose purpose is to share the hydrological risks of plants in high affluence and generation situations, which transfer energy to plants in low affluence and generation situation. - Average temperature changes: To mitigate this risk Cemig continually inspects and cleans the servitude ranges of its transmission lines to maximize safety and availability of transmission and distribution functions (always limited to minimal vegetation removal, avoiding where there is no interference with transmission and distribution lines). - Changes in precipitation and drought extremes: Management methods seek to reduce the magnitude of this risk in the medium term through preventive adaptation measures such as urban tree management through pruning, operation of weather stations and radar, weather forecast, which more accurately predicts the occurrence and intensity of thunderstorms, and the emergency plan with the allocation of maintenance teams for the rapid restoration of power supply. - Change in consumer behavior: This risk is managed by conducting the diagnosis of the electrical system for the need for expansion works; monitoring of operating conditions; and the reprioritizing of the works. Cemig estimates that the magnitude of this impact is medium, and occurs mainly in the years of low inflow in the reservoirs. The company's generating park currently consists of 87 plants, 83 (95%) of which are hydroelectric (21 UHEs and 62 SHPs) that are exposed to water risk. One of the ways to mitigate this risk is through the Energy Efficiency Index for Plant Planning - IEPE. IEPE measures the energy efficiency of Cemig's hydroelectric plants by comparing the verified generation of energy with the optimal generation, taking into account the observed flows, the maintenance of generating units and the compliance with operating restrictions.

	Impact	Description
Supply chain and/or value chain	Not yet impacted	Possible losses resulting from increased wind, flood, drought intensity may indirectly affect the operation of Cemig's energy business when they impact the supply chain, especially those directly involved in infrastructure deployment/maintenance (transmission and distribution). Thus, Cemig constantly monitors its supply chain, maintaining a high degree of demand and care based on the mapping of potential risks and probabilities of occurrence, as well as tangible and intangible impacts, calculated on financial values, and strategic for the company. In addition, Cemig seeks to align suppliers and contractors with its vision of sustainability, their commitments and corporate values. Among these corporate values, Cemig includes in its Supply Policy its Commitment to Climate Change. Cemig estimates that this impact could occur over a medium-term horizon, and that the impact magnitude will be low, as the company has a supplier classification system based on social and environmental criteria (102 classified in 2018), in addition to the categorization critical suppliers (117 ranked in 2018), out of a total of 1,438 active suppliers. Critical suppliers are those whose goods or services have a significant impact on a company's competitive advantage, market success, or survival. Another way to mitigate this risk will be through the development of intelligent supply chain management R&D being implemented by Mackenzie University in conjunction with the European Institute of Purchasing Management - EIPM. The first stage of this project is directed towards the elaboration of a Kraljic matrix, which aims to improve risk management and supplier classification. The deadline for the completion of this project is two years.
Adaptation and mitigation activities	Not yet impacted	Cemig promotes a series of initiatives that enables accurate management of the possible impacts on its business, among them, the following: - Hydrometeorological Monitoring: Preventively invests in practices that position it in a situation of greater security in the face of various scenarios, using modern techniques and equipment, such as the Storm Tracking System, Telemetry System and Hydrometeorological Monitoring, mathematical models of hydrological simulation and weather and climate forecasting. - Dam Safety: The process aimed at ensuring the safety of the dams operated and maintained by Cemig uses a methodology supported by the best national and international practices, complying with the Federal Law 12.334/2010, which establishes the National Dam Safety Policy, and its associated regulation (Normative Resolution No. 696/2015 of Aneel). In this context, field inspection procedures, instrumentation data collection and analysis, drafting 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 structures, the frequency of safety inspections and the monitoring routine are

	Impact	Description
		established. The vulnerability of each dam is automatically calculated and monitored by the Dam Safety Expert System (Inspector). - Distribution Development Plan: The PDD consists of undertaking projects related to the electric power system, associated with the expansion, reinforcement, renovation and renovation of Cemig D assets, such as substations and distribution lines. - Energy Alternatives: In Cemig's view, the term “Energy Alternatives” encompasses the entire energy chain, including transportation, transformation, technology routes, supply and storage, energy efficiency and final use of energy. As they are integral and mutually dependent elements in the energy matrix, the energy alternatives comprise new sources and technologies, distributed generation, smart grid design, electric vehicles, energy efficiency and the best use of traditional energy resources. Given its expertise in this area, the Company has participated in committees and groups. The company estimates that it may be impacted in the medium term and that it may cause increased operating costs due to the implementation of adaptation and mitigation actions.
Investment in R&D	Impacted	As a measure of its innovation effort, the Company has an indicator entitled INOV, which represents the ratio between investments made in R&D projects and other innovation investments in the current year, in relation to its net operating revenue. The target for 2018 was for this indicator to represent 0.30%. However, the result exceeded the target and indicated that 0.51% of net revenue for the year was devoted to research, development and innovation. This result follows the increases observed in recent years: in 2017, this index was 0.49% and in 2016 0.32%. The development of product and process innovations is responsible for creating goods and services that can increase asset availability, reduce end-customer service time, provide agility and mobility in dealership access and services, increase personal safety and develop new work tools and more modern equipment, among other benefits. This type of innovation typically occurs in Cemig's technical areas using the Strategic Technology Management (GET) methodology. One of Cemig's main drivers for innovation can be highlighted by the Research and Development (R&D) program. Within this program, initiatives are developed ranging from incremental technology projects, responsible for bringing operational efficiency gains and cost reduction, to those of a radical or disruptive nature, capable of providing radically new products, including impacting the market. In 2018 the R&D program was restructured based on Cemig's Strategic Digital Technology Innovation Plan, giving rise to the Cemig 4.0 Program. Cemig 4.0 is a program that aims to position the Company among companies in the sector capable of responding to new global trends and demands on energy systems. It is through this program that Cemig should explore the opportunities and

	Impact	Description
		challenges of the new business models in the segment. Following a strategy based on digitization, decarbonization, and decentralization, topics such as electric mobility, renewable energy, user experience, data intelligence, distributed generation, energy storage, cybersecurity strategy, new business models and talent for the digital age are the focus of Cemig 4.0 projects.
Operations	Impacted	Risks inherent to climate change, especially those related to the rain cycle and long dry periods, directly affect Cemig's business by reducing its power generation capacity. To act in a preventive manner, Cemig has been seeking strategies for the sustainability of its business, as follows: • Low carbon business development: implementation and maintenance of renewable energy plants in which Cemig already has expertise; and investing in new energy sources, primarily by participating in Renova Energia. • Carbon risk assessment and need to adapt to regulatory changes: Cemig adopts the practice of environmental due diligence for the acquisition of new assets, to assess the possible financial impact increased GHG emissions, given the possibility of emissions costs due to new regulations. • Climate change mitigation: Although Cemig already has a low intensity of GHG emissions, it strives to reduce its emissions, including setting targets for reducing emissions, electricity consumption and electricity losses. • Acting as a trader of renewable energy (wind and solar), strategy in progress, as per performance in Auction for Incentive Solar and Wind Energy Purchase. Through contracts starting in January 2020 through to 20 years (GT LP 03/2018 and GT LP 04/2018 Notice), the company has acquired 1628 MW of installed capacity. • Adapt to climate change: the company invests in the improvement of weather forecasting systems, plant infrastructure, power lines, and transmission networks to deal with the consequences of these events and to improve the prediction of water availability in their generating park. From 2013 to 2017, the Três Marias HPP had flows below the historical average. To avoid depletion of the reservoir's water supply, Cemig adopted measures such as downstream environmental testing and the definition of new operating ranges for the machines. The proper management of the reservoir ensured human supply and animal desedentation, benefited the irrigation project of Jaíba, in addition to generating electricity. The company considers this impact to be of high magnitude as the Energy Reallocation Mechanism (MRE) whose objective is to mitigate the impact of generation variability of hydroelectric plants is unable to mitigate the entire risk of generating agents in years of out-of-water hydrology, leading generators to short-term market exposure.

	Impact	Description
Other, please specify		

C2.6

(C2.6) Describe where and how the identified risks and opportunities have been factored into your financial planning process.

	Relevance	Description
Revenues	Impacted	Risks: As Cemig's generation of electricity is basically hydraulic, the risks inherent to climate change (mainly the reduction in the rate of rainfall, affecting the volume of water stored in the reservoirs and, consequently, reducing the power generation capacity in hydroelectric plants) leading generators to short-term market exposure can cause significant reduction in power supply, being a high magnitude impact. Such a situation may directly affect the Company's revenues, and even give rise to the possibility of lawsuits for any losses caused. Accidental disruption of transmission lines due to extreme weather conditions may result in reduced power availability, with a direct impact on billing as well as distribution lines, causing power supply disruption. Opportunity: Increasing average temperatures may lead to increased use of electric room climate and refrigeration equipment, impacting energy demand and increasing revenues.
Operating costs	Impacted	Risks: The eventual reduction in the average rainfall due to climate change may affect the volume of water stored in the reservoirs and, consequently, reduce the power generation capacity in hydroelectric plants, which leads to the National Electric System increase. the generation of energy through thermoelectric plants, whose operational cost is higher, besides increasing the carbon dioxide emission, and other pollutants. In addition, extreme weather conditions can cause transmission line and substation accidents, leading to additional equipment maintenance/rebuilding costs. Regulatory changes may result in increased costs if they result in increased taxation on power generation, transmission and/or distribution activities. Opportunity: The use of wind and/or photovoltaic generation can increase power generation capacity from clean sources that are independent of the hydraulic component, reducing the need for ONS thermal energy

	Relevance	Description
		dispatch. The company was impacted in the years of low rainfall, as occurred in 2014 and 2017, however, the Energy Reallocation Mechanism (“MRE”) mitigated a part of the impact of generation variability of hydroelectric plants. When all plants generate below the required value, the mechanism reduces the available energy of the plants causing a negative exposure in the short term market and, consequently, the need to purchase energy at the Difference Settlement Price - PLD. In years of very critical hydrology, the available energy reduction factor can compromise more than 20% of the available energy of the plants, and therefore is of high magnitude.
Capital expenditures / capital allocation	Impacted	Risk: Climate change determines the need for the Company to make additional investments to maintain and improve its distribution network. The Distribution Development Program (PDD) contributes to the mitigation of this risk, as well as meeting the increased demand arising from the vegetative growth of the population. The company considers the magnitude of this impact to be average, and the expansion, reinforcement works at high, medium and low voltage represent 15% of PDD investments.
Acquisitions and divestments	Impacted	Opportunity: The uncertainty regarding the level of rainfall and, consequently, the reduced capacity to guarantee generation by Cemig's hydroelectric plants, give rise to the need for diversification of the Company's generating park and stimulate the construction/acquisition of wind farms or photovoltaics, technologies in which Cemig already has expertise. The company considers the magnitude of this impact to be low due to the hydrological risk renegotiation. In addition, the company approved in 2018 the multi-annual business plan to undertake wind and solar investment studies aimed at diversifying its generation park.
Access to capital	Not yet impacted	Opportunity: Cemig participates in various sustainability indices and rankings (DJSI, ISE, Oekom, CDP, Sustainalytics, among others), which contributes to communicating the Company's sustainability practices, including its mitigation actions. the effects of climate change on the market and thereby facilitate access to investor and financial market capital. The company estimates that it may be impacted in the long run if its participation in non-renewable sources increases. In this way, GHG emissions may be increased, negatively affecting the company’s performance in sustainability indexes.

	Relevance	Description
Assets	Impacted for some suppliers, facilities, or product lines	Risk: Extreme weather events may result in Cemig's water reservoir overloading and even damage to generating units. Cemig seeks to mitigate this risk by investing in dam safety (prevention) and also by installing a weather radar (disaster prevention). The magnitude of this impact is low due to the maintenance services of its plants. Opportunity: In order to reduce the impact of climate change, Cemig's strategic driver is the pursuit of diversification of its energy matrix; As a result, the Company has developed expertise in renewable energy generation (mainly wind and photovoltaic) and is constantly evaluating new technologies through its Research and Development program. This expertise is an asset that may eventually be traded in the form of the sale of operating units already installed or even rendering of services.
Liabilities	Impacted	Risk: Cemig's activities are capital intensive. Naturally, the incorporation of generation assets to minimize the impact of climate change may cause the Company to incur indebtedness. The magnitude of this impact is high due to the company's high indebtedness.
Other		

C3. Business Strategy

C3.1

(C3.1) Are climate-related issues integrated into your business strategy?

Yes

C3.1a

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

Yes, qualitative and quantitative

C-AC3.1b/C-CE3.1b/C-CH3.1b/C-CO3.1b/C-EU3.1b/C-FB3.1b/C-MM3.1b/C-OG3.1b/C-PF3.1b/C-ST3.1b/C-TO3.1b/C-TS3.1b

(C-AC3.1b/C-CE3.1b/C-CH3.1b/C-CO3.1b/C-EU3.1b/C-FB3.1b/C-MM3.1b/C-OG3.1b/C-PF3.1b/C-ST3.1b/C-TO3.1b/C-TS3.1b) Indicate whether your organization has developed a low-carbon transition plan to support the long-term business strategy.

Yes

C3.1c

(C3.1c) Explain how climate-related issues are integrated into your business objectives and strategy.

i. Risks and opportunities related to climate change are classified and prioritized in exposure matrices by the Corporate Risk Monitoring Committee and presented to the Board of Executive Officers. These risk and opportunity assessments are therefore presented to senior management, who use them to develop the Company's Strategic Planning. With Cemig's strategy defined and approved by the Board of Executive Officers, the other boards of directors are planning their activities. The Strategic Planning process is conducted by the Board of Directors, with the participation of the Executive Board.

ii. Climate change aspects that have influenced Cemig's strategy:

Development of low carbon business: Cemig has identified business opportunities and market advantages arising from its low carbon energy matrix, which are primarily directed to) implementation and renovation of renewable energy plants in which Cemig already has expertise and ii) investment in new energy sources.

Regulatory Changes: Cemig identifies climate-related regulatory risks that are seriously considered in the Company's strategic decision-making. In particular, it recognizes the commitments made to the energy sector in Brazil's Nationally Determined Contribution (NDC) and manages the associated risks through participation in business associations, follow-up on international negotiations and their national developments. Cemig conducts environmental due diligence for the acquisition of new assets (carbon risk assessment) to assess the possible financial impact of the increase in its GHG emissions from this asset, given the possibility of internalization of emission costs due to the new regulations.

Need to mitigate climate change: Although Cemig already has low intensity of GHG emissions, it strives to reduce its emissions, including setting targets for reducing emissions, electricity consumption and electricity losses in view of the commitments assigned in the Brazilian NDC to the energy sector. In addition, the use of an internal carbon price in investment assessments for fossil fuel-based ventures is in line with global trends in using carbon pricing instruments as a mechanism for promoting climate change mitigation.

Need to adapt to climate change: Cemig has a generating park with low intensity of GHG emissions, as it is predominantly hydraulic, but subject to the consequences of climate change. It therefore invests in improving weather forecasting systems, improving the infrastructure of its plants, transmission

lines and distribution grids to cope with the consequences of these events and improving the forecasting of water availability in its generating park. . Additionally, it has been seeking to diversify its electric matrix through the creation of Cemig GD, a wholly owned subsidiary focused on serving the distributed generation market.
ii. Strategy components influenced by short-term climate change (up to five years): Cemig invests in state-of-the-art techniques and equipment that enable better forecasting intensity and storm location quality. In addition, it has set its corporate emission reduction target to reduce Scope 1 (tCOGHG intensity by2e)8% by 2021, based on 2014 emissions. It has also set its target for reducing electricity losses. committing to total losses in 2018 of less than 7.31%, as established by the regulatory target.
iii. Components of the strategy influenced by long-term climate change (over ten years): The need to consolidate low-carbon energy matrices has guided R&D projects that could be implemented by Cemig on a large scale in the future. These projects include: i) elaboration of the second version of the Minas Gerais solarimetric atlas and ii) electricity generation in solar plants connected to the electric system. The climate change scenario opens up new business opportunities for the Company, with high demand expected in the long term. Efficientia SA (ESCO) is part of Cemig, which operates in the development and feasibility assessment of technological solutions that promote the efficient use of energy to non-residential customers. In addition, Cemig has taken into consideration in its investment decisions the expectation of a progressive increase in the ambition of nationally determined contributions to the Paris Agreement - which, for Brazil, should be reflected in stricter emission reduction targets. to post-2025 energy.
iv. Maintaining a predominantly renewable matrix and carbon risk assessment allow Cemig to anticipate the risks associated with the increased cost of electricity generation.
Additionally, the development of new technologies, especially solar power generation, places Cemig at the forefront in the electricity sector, allowing the incorporation of new technologies in its headquarters and the diversification of its business.
v. More substantial strategic decisions taken by Cemig in 2018, influenced by business opportunities, enhanced by climate change:
· Actions that minimize the physical risks arising from extreme weather events:
· Cemig acts as a trader of renewable energy (wind and solar), according to its activities. at Solar and Wind Incentive Energy Purchase Auction. In the Cemig GT LP 03/2018 Notice, held on 06/06/2018, 431.49 average MW were acquired in contracts with supply start in January / 2022 and duration of 20 years, totaling 1240 MW of installed capacity. In the Cemig GT LP 04/2018 Notice, held on 10/04/2018, 152.5 average MW were acquired in contracts with supply start in January / 2022 and duration of 20 years, totaling 388 MW of installed capacity.
· Actions that Increase Low Carbon Business Development Opportunities:
· In June 2018, Cemig consolidated its entry into the distributed generation business through the formation of the wholly owned subsidiary Cemig Geração Distribuida SA - Cemig GD. The company came up expecting that in the next two years 250 MW of installations will be realized.
· In 2018, Cemig's R&D program was restructured based on Cemig's Strategic Digital Technology Innovation Plan, giving rise to the Cemig 4.0 Program. The program aims to position the Company among companies in the sector capable of responding to new trends and global demands on energy systems. It is through this program that Cemig should explore the opportunities and challenges of the new business models in the segment. Following a strategy

based on digitization, decarbonization and decentralization, topics such as electric mobility, renewable energy, user experience, data intelligence, distributed generation, energy storage, cybersecurity strategy, new business models and talent for the digital age are the focus of Cemig 4.0 projects.

C3.1d

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

Climate-related scenarios	Details
RCP 2.6 RCP 4.5 RCP 6 RCP 8.5 Other, please specify SRES	The IPCC AR4 (CMIP3) and AR5 (CMIP5) global climate models have been used in the development of the work "Effect of climate change on river basin hydrological regime and in assured energy from hydropower". The integration of the CMIP3 model was performed using SRES - Special Report Emission Scenarios emission scenarios, which show various types of trajectories or environmental realities that depend on emission levels. Assured energies were calculated for the 2040, 2070, and 2100 horizons so that the results of the work could serve as a long-term planning tool for the expansion of the hydroelectric generator park, enabling the consideration of climate change scenarios. The result of the Strategic R&D Project No. 010/2008 "Effect of climate change on the hydrological basin regime and the assured energy of hydropower" indicates an increase in air temperature in all regions of the country, a reduction in rainfall (mainly in the Amazon). and Northeastern Brazil) and increased precipitation in the southern region of the country. The result of the work indicates a possible downward trend in assured energy (2041 onwards) in the event of evolution according to the scenario A1B of greenhouse gas emissions. It can be concluded that the Brazilian generator park has been decreasing its capacity of regularization in face of the energy demand of the system over the last decades and is increasingly sensitive to the variations of precipitation and, consequently, of the affluent natural flows. Another project developed by Cemig was the R&D GT 0552 - Evaporation of the Funnel Hydroelectric Power Plant Reservoir: Water Footprint Characterization. Three cascaded hydroelectric power plants were evaluated. To simulate the impacts of climate change on runoff we considered scenarios RCP 4.5 and RCP 8.5, simulated by regional climate models Eta-HadGEM2-ES and Eta-MIROCC5. The period evaluated was control (1961-2005), 2007-2040, 2041-2070, 2071-2099. Considering Eta-HadGEM2-ES, the largest reductions in monthly average flows were observed in the 2007-2040 period under RCP 4.5 and during the 2071-2099 period under RCP 8.5. Considering Eta-MIROC5, the largest average monthly flow reductions were observed in the period 2071-2099 under RCP 4.5 and during 2007-2040 under RCP 8.5. The projected impact on the most critical power generation potential is expected during the period 2071-2099 at the Itutinga hydroelectric

Climate-related scenarios	Details
	plant, considering the Eta-HadGEM2-ES under the influence of RCP 8.5. The results indicate that the plant should not operate 69.1% of the time, because the minimum generation (9.7 MW) should not be reached. Considering Eta-MIROC5, the most critical projection is expected at the Itutinga plant during 2071-2099 under RCP 4.5. The results indicate that the plant should not operate 10.5% of the time, because the minimum generation (9.7 MW) should not be reached. The results indicate serious problems of water availability in the region. If the reduction trends are maintained for the entire Rio Grande basin, the basin's production capacity could be significantly reduced. The outcome of the assessment of these scenarios contributed to the development of the short-term initiative (2019-2020) to study the option to purchase assets from existing wind and solar energy contracts; and the medium and long-term initiative (2021 to 2040) to expand wind, solar and natural gas generation capacity. As a result of this initiative, at the end of 2018, Cemig decided to invest in solar plants as of 2019. Thus, the company seeks to diversify its generation park, gradually reducing the percentage of installed capacity in hydroelectric plants.

C-AC3.1e/C-CE3.1e/C-CH3.1e/C-CO3.1e/C-EU3.1e/C-FB3.1e/C-MM3.1e/C-OG3.1e/C-PF3.1e/C-ST3.1e/C-TO3.1e/C-TS3.1e

(C-AC3.1e/C-CE3.1e/C-CH3.1e/C-CO3.1e/C-EU3.1e/C-FB3.1e/C-MM3.1e/C-OG3.1e/C-PF3.1e/C-ST3.1e/C-TO3.1e/C-TS3.1e) Disclose details of your organization's low-carbon transition plan.

In November 2018, the Board of Directors approved Cemig's new strategic planning, consisting of the Long-Term Strategy (2019-2040) and the Multiannual Business Plan (2019-2025). The strategic foundations (mission, vision and values) have been updated as well as the guidelines, drivers, indicators, goals and initiatives of Cemig and its businesses.

The new strategic planning cycle has the mission of "providing integrated clean and affordable energy solutions to society in an innovative, sustainable and competitive manner" and includes the following lines of action:

1. Prioritization of renewable energy sources: Maintain or increase the composition of your renewable energy matrix.

1.1 Diversify the GHG-free energy matrix.

1.2 Assess the carbon risk of new projects and asset acquisitions and mergers.

1.3 Study brownfield and greenfield in wind, solar and natural gas.

KPI: % of clean energy traded.

2. Climate change adaptation: Establish adaptation plans that minimize the effects of climate change on electricity generation, transmission and distribution activities (in the short and medium term).
2.1 Make investments in the modernization of infrastructure services for the generation, transmission and distribution of electricity with a view to minimizing climate risks.
2.2 Make investments in dam safety, reservoir operational measures.
2.3 Make investments in weather forecasting system.
2.4 Track regulatory changes.
3. Reduction of greenhouse gas emissions: Identify the processes that most contribute to GHG emissions and enable the most effective actions to reduce these emissions.
3.1 Promote conservation and energy efficiency.
3.2 Develop solutions to reduce energy losses in the electrical system.
3.3 Optimize and adapt the vehicle fleet and the logistics of its services to reduce fuel consumption.
3.4 Improving SF6 gas management.
3.5 Perform continuous monitoring of their emissions.
KPIs:
• Scope 1 and 2 combined targets, with 2022 as target year and 2017 base year. Reduce scope 1 and scope 2 emissions as follows: maintain SF6 emission percentage at a maximum of 0.66%; have the Igarapé TPP emission factor at a maximum of 0.88 t CO2 / MWh (2017 factor) and reduce 10% of emissions from mobile sources compared to 2017. For Scope 2 emissions the following was defined: criterion: to maintain at 41,334 MWh the electricity consumption (2017 value) and to have 11,23% of total losses in 2022.
• Scope goal 2: In 2018 Cemig set an intensity target for scope 2, which consists of 11.23% of total losses in 2022. The value in 2018 was 12.48%
4. Participation in discussion forums, Communication and Stakeholder Engagement: Participate in business or government discussion forums on the topic, collaborating in the formulation of policies and measures to combat climate change. Develop awareness-raising activities aimed at changing the behavior of its employees, contractors and other interested publics.
4.1 Participate in climate change committees.
4.2 Participate in cap-and-trade initiatives.
4.3 Disseminate the goal of sustainable development 13 (SDG 13).
KPI: Number of participants
5. Risk and Opportunity Management: Identify key climate change risks and opportunities for your business and develop monitoring and control measures, particularly in relation to Cemig's potential vulnerabilities to climate change.

5.1 Develop business plan for entry into the distributed generation market, defining aspiration and strategy for Cemig GD, keeping it updated according to current legislation.
6. Research, Development and Innovation
6.1 Promotion Research smart grid technologies, hybrid generation, energy storage, electro stations, digitization, among others.
6.2 Encourage the development of climate change adaptation projects in the generation, transmission and distribution businesses.
6.3 Conduct R&D projects to identify the vulnerabilities of electricity distribution and transmission lines due to climate change scenarios.
7. Supplier Development: Develop climate awareness initiatives and action plans with suppliers.

C4. Targets and performance

C4.1

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

Both absolute and intensity targets

C4.1a

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

Target reference number

Abs 1

Scope

Scope 1+2 (location-based)

% emissions in Scope

100

Targeted % reduction from base year

29

Base year

2017

Start year

2018

Base year emissions covered by target (metric tons CO2e)

713,262

Target year

2022

Is this a science-based target?

No, but we anticipate setting one in the next 2 years

% of target achieved

78

Target status

Underway

Please explain

Cemig set two tCO2 emission targets in 2018 which is an absolute target based on the combination of scope emissions 1 and 2.
As a reference, the target year 2022 and base year 2017 were determined for total emissions. For scope 1 emissions we adopt the following criteria: maintain the SF6 emission percentage of a maximum of 0.66%; have the Igarapé TPP emission factor at a maximum of 0.88 t CO2 / MWh (2017 factor) and reduce 10% of emissions from mobile sources compared to 2017. For Scope 2 emissions the following was defined: criterion: to maintain 41334 MWh of electricity consumption (2017 value) and to have 11.23% of total losses in 2022.
Scope 1 emissions in 2018 were: 8,920 tCO2e from the fleet of vehicles, boats and aircraft; 5,147 tCO2e of fugitive SF6 gas emissions from electrical equipment and fugitive emissions from natural gas distribution; 21,220 tCO2e, from the Igarapé Thermal Power Plant; 214 tCO2e from the use of emergency generators; 67 tCO2e from agricultural emissions and land-use change.

CEMIG's Scope 1 emissions in 2018 totaled 35,568.41 tCO2e, representing a 27.2% reduction over the previous year (2017 = 48,849 tCO2e). In 2018, the total loss indicator (IPTD) was 12.48% in relation to the total energy injected into the distribution system. Of this total, 8.77% was related to technical losses (PPTD), while 3.71% was related to non-technical losses (PPNT), values expressed in relation to the total energy injected into the distribution system. This result is above the established target (target of 11.75% in 2018 and 11.23% in 2022).

C4.1b

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number

Int 1

Scope

Scope 2 (location-based)

% emissions in Scope

99

Targeted % reduction from base year

29

Metric

Other, please specify

Total losses in electricity transmission and distribution

Base year

2017

Start year

2018

Normalized base year emissions covered by target (metric tons CO2e)

664,213

Target year

2022

Is this a science-based target?

No, but we anticipate setting one in the next 2 years

% of target achieved

12

Target status

Underway

Please explain

Cemig established an intensity target in 2018 for scope 2, based on emissions from total losses in the transmission and distribution of electricity. As a reference, the target year 2022 and base year 2017 were determined.
In 2018, the total loss indicator (IPTD) was 12.48% in relation to the total energy injected into the distribution system. Of this total, 8.77% was related to technical losses (PPTD), while 3.71% was related to non-technical losses (PPNT), values expressed in relation to the total energy injected into the distribution system. This result is above the established target (target of 11.75% in 2018 and 11.23% in 2022).
Of the total Scope 2 emissions in 2018, 0.6% of them, equivalent to 3,066.84 tCO2e, resulted from energy consumption, and 99.4%, equivalent to 515,145.95 tCO2e, resulted from total electrical losses. It is noteworthy that Scope 2 is strongly influenced by the SIN emission factor, which decreased by 20% compared to 2017, from 0.0927 tCO2e / MWh to 0.0742 tCO2e / MWh.
CEMIG's scope 2 emissions in 2018 totaled 518,212.79 tCO2e, representing a decrease of 22.0% over the previous year (in 2017, 664,413 tCO2e).

% change anticipated in absolute Scope 1+2 emissions

11.75

% change anticipated in absolute Scope 3 emissions

0

C4.2

(C4.2) Provide details of other key climate-related targets not already reported in question C4.1/a/b.

Target

Other, please specify

SF6 emission percentage reduction

KPI – Metric numerator

Percentage of maximum 0.66% of installed SF6 mass (percentage relative to 2018).

KPI – Metric denominator (intensity targets only)

Total amount (kg) of SF6 installed.

Base year

2018

Start year

2018

Target year

2022

KPI in baseline year

0.66

KPI in target year

0.66

% achieved in reporting year

100

Target Status

Underway

Please explain

Although the target was reached in 2018, Cemig needs to maintain its management and performance in order to maintain this amount, since SF6 mass is expected to increase in the period. Cemig's electrical system.
The target in 2018 was achieved, the relative losses (emissions/total installed quantity) of SF6 was 0.66% in 2018. In 2018, there is a 4% increase in SF6 emissions, due to the increase in emissions. at Cemig Distribuição. As a measure to encourage the reduction of SF6 losses, a sustainability indicator is being proposed for the distribution business that considers fugitive emissions of SF6 as a variable.
In 2018, an SF6 management procedure was prepared for Cemig Distribuição as a means of standardizing fugitive emissions estimates and managing SF6-containing equipment. The company continues to develop SF6 loss mitigation practices by either eliminating leaks or eliminating maintenance losses and investing in more efficient equipment.

Part of emissions target

-

Is this target part of an overarching initiative?

No, it's not part of an overarching initiative

C4.3

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

Yes

C4.3a

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

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	0	
To be implemented*	3	66.57
Implementation commenced*	7	246.65
Implemented*	3	99,489.26
Not to be implemented	0	0

C4.3b

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

Initiative type

Other, please specify

Transportation (fleet)

Description of initiative

Estimated annual CO2e savings (metric tonnes CO2e)

3,833

Scope

Scope 1

Voluntary/Mandatory

Voluntary

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

5,200,000

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

3,641,127

Payback period

4 - 10 years

Estimated lifetime of the initiative

6-10 years

Comment

The investment value considered the cost of operation and maintenance of the Electronic Management System installed in light vehicles and pickup trucks to control their use. The fleet of light vehicles and trucks used by Cemig is leased from third parties. This fleet lease agreement is effective from September 2016 to September 2021.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

85.26

Scope

Scope 3

Voluntary/Mandatory

Voluntary

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

0

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

17,532

Payback period

No payback

Estimated lifetime of the initiative

11-15 years

Comment

The projects implemented by Efficientia in 2018 were:
1) PUC-MG lighting project, which replaced 19,452 16W and 32W tubular fluorescent lamps from the Pontifical Catholic University of Minas Gerais - Campus Coração Eucarístico with 9W and 18W LED tubular lamps, respectively. The project contemplates all internal lighting of the 49 buildings of the unit.
2) The project included the lighting system in which 2386 40W and 20W tubular fluorescent lamps from Santa Casa de Misericórdia de Vitória were replaced by 18W and 9W LED tubular lamps, respectively.
3) The project contemplated the lighting system in which 562 lamps responsible for Maternity lighting (Hospital Pró-Madre) were replaced. In the project, 541 20W and 40W tubular fluorescent lamps were replaced by 9W and 18W LED tube lamps, respectively, plus 21 reflectors with 400W vapor lamps, which will be replaced by 113W LED projectors.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

95,571

Scope

Scope 3

Voluntary/Mandatory

Mandatory

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

0

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

30,707,066

Payback period

No payback

Estimated lifetime of the initiative

6-10 years

Comment

Cemig's Energy Efficiency Program actions that resulted in a reduction of the Company's scope 3 emissions were:

1. Installation of Low-income solar heating systems;
2. Efficiency of low-income communities (Lamps, Refrigerator, Visits);
3. School Efficiency (Lighting and Photovoltaic);
4. Installation of solar heating systems in hospitals;
5. Efficiency of Hospitals (Autoclaves, Lighting, Surgical Focus, Dryers, and Photovoltaic);
6. Installation of solar heating systems in long-term care facilities for the elderly;
7. Bonus for engine replacement;
8. Funding for projects selected by Public Call.

C4.3c

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

Method	Comment
Compliance with regulatory requirements/standards	Federal Law No. 9,991 / 2000: This Law establishes that 1% of the organization's net operating revenue shall be directed to R&D financing and energy efficiency programs. Thus, Cemig created Intelligent Energy (EI), a program focused on energy efficiency, made up of several multi-annual and socio-environmental projects, which develop energy efficiency actions in low-income communities (in compliance with article 1, item V of Law No. 9,991 / 2000, included by Law No. 12,212 / 2010) and in nonprofit and philanthropic institutions.
Internal finance mechanisms	Vehicle fleet replacement uses resources from the Company's Investment Programs. Cemig's policy is to renew its vehicle fleet annually so that the average age of vehicles does not exceed five years, a legal period of depreciation set by the granting authority.
Dedicated budget for low-carbon product R&D	Cemig's Research and Development (R&D) Program aims to encourage the constant pursuit of innovations to meet the technological challenges of the electricity sector. In this context, Law 9,991 / 2000 establishes that electricity distribution, generation and transmission concessionaires and licensees annually apply part of their net operating revenues to the Electric Energy Sector Research and Development Program, regulated by Aneel. In order to ensure the application of this resource, Cemig periodically publishes calls for projects in various lines of action. Project lines related to climate change include: Alternative sources, distributed and decentralized generation, thermoelectric generation and energy efficiency; Basin management and energy planning; Measurement, billing and business losses; and environment.
Dedicated budget for other emissions reduction activities	Within the Distributor Development Program (PDD), there is a budget dedicated to reducing Cemig's electrical losses in Cemig's system and initiatives to reduce emissions from the Cemig and the national electricity system.
Internal price on carbon	Cemig assesses the risk of increased carbon emissions in its energy matrix and the financial impact of this increase by conducting environmental due diligence and sensitivity analyzes related to the acquisition of new projects, which is helping the Company to make decisions about expanding their business.
Other Distributed generation	The Aneel Normative Resolution No. 482/2012 establishes the general conditions for distributed micro-generation and mini-generation access to electricity distribution systems by means of electric energy compensation modalities. With this,

Method	Comment
	the Brazilian consumer was able to generate his own electricity from renewable sources and supply the surplus to the electricity grid of his locality. These are innovations that combine financial economy, socio-environmental awareness and self-sustainability. In general, the presence of small generators close to the loads can provide several benefits for the electric system and utilities, including: 1. Postponement of investments in expansion in distribution and transmission systems; 2. Low environmental impact; 3. Improvement of network voltage level during heavy load period; 4. Increased energy efficiency of the source by reducing losses in electricity generation and transmission; 5. Diversification of the energy matrix; 6. Favoring the creation of new business models applicable to the electricity sector. Cemig, a pioneer in the distributed generation process and aligned with the development of technology, connected the first micro power generation unit in Brazil in September 2012, the same year that ANEEL created the Electric Power Compensation System. Since then, Cemig has been leading the market for distributed generation connections in the country. In the period between the publication of Resolution 482, in 2012, and December 2018, 10,713 generating units were already connected by the Company, with 10,622 (99%) as photovoltaic solar source, 64 as biogas, 24 as hydro and three cogeneration (biomass), totaling an installed capacity of 113.7 MW with distributed generation. When the national scenario is analyzed, Cemig's connections represent 20% of all distributed generation connections in Brazil and the 113.7 MW installed by Cemig represent 18% of the total 676 MW installed in Brazil. It is important to highlight the rapid evolution of this market and the significant increase in demand for this solution. In 2018, 6,249 new installations were made by the Company, which practically doubled the total number of connections in Cemig's concession area. This represents a 122% increase from 2,814 installations in 2017.

C4.5

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

Yes

C4.5a

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

Level of aggregation

Group of products

Description of product/Group of products

Renewable energy generation: Cemig has over 97.9% of its installed capacity to generate energy from renewable sources. By generating renewable energy, Cemig replaces power generation that is likely to occur from fossil sources. This initiative allows Scope 2 reduction of all consumers connected to the national electricity system.

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

Avoided emissions

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

Other, please specify

Internal classification

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

28.63

Comment

Renewable energy generation:

1- This initiative allows Scope 2 reduction of all consumers connected to the national electricity system.

2- By injecting renewable energy into the national electricity system, Cemig promotes the reduction of the emission factor of this system, benefiting all energy consumers connected to it. In 2018, 14,675 GWh of energy was generated from renewable sources (hydro + wind + solar).

3- It is estimated that the generation of renewable energy in 2018 avoided the emission of 95,656.26 tCO2.

4- It was assumed that the generation of renewable energy by Cemig avoided the generation of energy by a thermal source in the grid of the National Interconnected System. To calculate emission reductions, we used the National Electric System (SIN) emission factor for 2018, calculated for GHG inventories by the MCTI (Ministry of Science, Technology and Innovation), multiplied by electricity generated by sources.

Level of aggregation

Group of products

Description of product/Group of products

Energy efficiency services: Efficientia S.A. is a wholly owned subsidiary that operates in the development and implementation of energy efficiency projects, cogeneration of energy and offers consultancy to optimize the energy matrix of industries. This initiative allows the reduction of Scope 2 of third parties since it reduces the consumption of electricity of the national electric system of its customers.

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

Avoided emissions

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

Other, please specify

Internal classification

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

1

Comment

Energy Efficiency Services - Efficientia SA

1- This initiative allows the reduction of Scope 2 of third parties, as it reduces the electricity consumption of its customers' national electricity system.

2- The projects implemented by Efficientia in 2018 were:

a) PUC-MG lighting project, which replaced 19,452 16W and 32W tubular fluorescent lamps from the Pontifical Catholic University of Minas Gerais - Eucharistic Heart Campus with 9W and 18W LED tubular lamps respectively. The project contemplates all internal lighting of the 49 buildings of the unit.

b) The project included the lighting system in which 2,386 40W and 20W tubular fluorescent lamps from Santa Casa de Misericórdia de Vitória were replaced by 18W and 9W LED tubular lamps, respectively.
c) The project contemplated the lighting system in which 562 lamps responsible for Maternity lighting (Hospital Pró-Madre) were replaced. Of this value, we have 541 20W and 40W tubular fluorescent lamps replaced by 9W and 18W LED tube lamps, respectively, plus 21 reflectors with 400W vapor lamps, which will be replaced by 113W LED projectors.
The generation of Certified Emission Reductions (CERs) under the CDM was not considered in any implemented project.
It should be noted that these Efficientia projects use performance contracts in which Efficientia provides the necessary resources and recovers its investment through the savings obtained in the projects. For this reason, the value in the adjacent column is zero.

Level of aggregation

Product

Description of product/Group of products

Natural gas: Gasmig, a subsidiary of Cemig, is the exclusive distributor of natural gas channeled throughout the territory of Minas Gerais state. Also, Gasmig develops the Inovagás project, which aims to serve customers with efficient energy solutions. This initiative allows the reduction of Scope 1 of third parties since it will enable its customers the consumption of fossil fuel with a lower GHG emission factor.

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

Low-carbon product

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

Other, please specify

Internal classification

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

8.96

Comment

Natural Gas - Gasmig
1- This initiative allows the reduction of Scope 1 from third parties, as it allows its customers to consume fossil fuel with a lower GHG emission

factor.
2- Gasmig's infrastructure investment in 2018 totaled R$70.3 million, of which R$50.1 million in the expansion of the Distribution Network (including the Maintenance and Operation of the RDGN) in the State of Minas Gerais, R$6.7 million in Telecommunication / IT and R$13.4 million in Infrastructure.
In 2018, the customer base jumped to 42,301, with the connection of almost 11,000 units in 2018 to the natural gas distribution network to serve this segment.3- The Company brings natural gas infrastructure to strategic regions of the state, enabling more carbon-intensive fossil fuels are replaced in manufacturing industries.
4- In 2018, the consumption of natural gas distributed by Gasmig avoided the emission of 130.151 tCO2.
5- Gasmig monitors the amount of natural gas supplied to the sectors it serves, having sold 1.1 billion m3 in 2018. The estimated emission reduction was made based on the assumption that, in the absence of gas distribution natural gas, the industry would consume fuel oil (corresponding to 79% of natural gas consumed in 2018), vehicles would consume gasoline (3.85%), thermoelectric plants would use diesel (13.68%) and general use (commercial, cogeneration, and generation) would use diesel or stationary source fuel oil (3.16%). Using GHG Protocol Brazil emission factors, lower calorific values and densities, emissions were calculated with natural gas (real scenario) and emissions if fuel oil, gasoline, and diesel were used (baseline scenario). By subtracting the actual scenario emissions from the baseline scenario emissions, the avoided emissions were defined. The generation of CERs (Certified Emission Reductions) under the CDM was not considered by Gasmig.

C-EU4.6

(C-EU4.6) Describe your organization’s efforts to reduce methane emissions from your activities.

Cemig does not generate significant methane emissions from its power generation processes, since methane emissions from hydroelectric plants are irrelevant, as has been pointed out in the specialized literature, and the burning of fuel oil at the Igarapé Thermoelectric Plant also does not emit methane in significant quantities. CEMIG's total CH4 emissions in 2018 are equivalent to 171.50 tCO2e, which represents only 0.5% of total Scope 1 emissions.
However, Cemig manages the potential risk of leakage in its natural gas distribution operations and therefore of methane emissions, the main component of the gas. To identify potential natural gas leaks and reduce the volume of fugitive gas, considered a technical loss of the distribution operation, Gasmig remotely monitors the network pressure through data loggers. Additionally, natural gas is artificially odorized to facilitate leak identification by the local population and the Fire Department. Gasmig has a 24-hour call center so that leak detection can be reported.
Gasmig has a cathodic protection system associated with an external polyethylene coating structure, which offers mechanical and anticorrosive protection of the piping. By preserving the integrity of its pipelines, the Company is making efforts to reduce methane emissions from its activities.

C5. Emissions methodology

C5.1

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

Scope 1

Base year start

January 1, 2017

Base year end

December 31, 2017

Base year emissions (metric tons CO2e)

48,849

Comment

The historical base year was chosen and referenced due to the stipulated year to the goal of reducing total energy losses (scope 2) established by the company in 2018.

Scope 2 (location-based)

Base year start

January 1, 2017

Base year end

December 31, 2017

Base year emissions (metric tons CO2e)

664,413

Comment

For Scope 2, 2017 was the year set by the regulatory agent (Aneel) for a new cycle of indicators to reduce total electricity losses.

Scope 2 (market-based)

Base year start

Base year end

Base year emissions (metric tons CO2e)

0

Comment

Not applicable to Cemig.

C5.2

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions.

Brazil GHG Protocol Programme
IPCC Guidelines for National Greenhouse Gas Inventories, 2006
ISO 14064-1
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

C6. Emissions data

C6.1

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

Reporting year

Gross global Scope 1 emissions (metric tons CO2e)

35,568.41

Start date

January 1, 2018

End date

December 31, 2018

Comment

Igarapé TPP (131 MW installed capacity) operates to meet the contingencies of the Brazilian Interconnected Electric System (SIN) and, in 2018, was responsible for 60% of the Scope 1 emissions from Cemig.
It is important to remember that the decision of energy dispatch in Brazil (composition of hydrothermal generation each week) is made by the National Electric System Operator (ONS), based on prospective analyzes of prediction of future inflow scenarios, in the expectation of growth of the energy consumption and the definition of the expansion schedule of new plants. During periods of favorable hydrology and high levels of water storage in the system reservoirs, the decision to generate thermal power plants is minimized, prioritizing hydroelectric generation.
Due to the above, there was a 27.2% reduction in total Scope 1 emissions compared to 2017 (48,849 tCO2e).

C6.2

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

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We have no operations where we are able to access electricity supplier emission factors or residual emissions factors and are unable to report a Scope 2, market-based figure

Comment

For companies in the electricity sector that own generation and distribution businesses, such as Cemig, it is not possible to buy energy from other suppliers, therefore it is not possible to account for emissions based on the market.

C6.3

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

Reporting year

Scope 2, location-based

518,212.79

Start date

January 1, 2018

End date

December 31, 2018

Comment

For companies in the electricity sector that own generation and distribution businesses, such as Cemig, it is not possible to buy energy from other suppliers, therefore it is not possible to account for emissions based on the market.

C6.4

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

Yes

C6.4a

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

Source

CO2 emissions from the use of fire extinguishers.

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions excluded

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

No emissions excluded

Explain why this source is excluded

The fugitive CO2 emissions from the use of fire extinguishers are only accounted for by Cemig D. Other units have no control over such data. However, this data is not relevant for Cemig, since the share of these emissions is very unrepresentative compared to the other sources of emission from the company (0.01 out of 11,573.98 tCO2e from Cemig D scope 1 emissions).

C6.5

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

Purchased goods and services

Evaluation status

Relevant, calculated

Metric tonnes CO2e

71.19

Emissions calculation methodology

The Emissions Inventory CEMIG's GHG Program was prepared via CLIMAS, a calculation software developed by WayCarbon, which has a database with the up to date emission factors available for each type of source (for example, the Brazilian GHG Protocol Program for Brazil and, when not available, internationally accepted references such as GHG Protocol, IPCC, EPA, and DEFRA).
Generically, GHG emissions and removals are calculated for each source individually according to the following formula:
Emission = Activity_Data * Emission Factor * Global Heating Potential
Emission factors are based mainly on the following references: IPCC (2006), Brazilian GHG Protocol Program (2018), National Energy Balance (2015) and Ministry of Science, Technology, Innovations, and Communications (2018).

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

0

Explanation

Capital goods

Evaluation status

Not relevant, explanation provided

Explanation

In 2017, in order to restore the Company's financial balance, Cemig began a divestment program. The objective of the program is to establish an asset sale process following the following criteria for prioritizing the assets to be divested:
a) more liquid assets;
b) assets that do not bring short-term returns;
c) non-strategic assets and/or with minor interests.
In this context of divestitures, emissions linked to the acquisition of capital goods were not relevant to Cemig in 2018.

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

Evaluation status

Not relevant, explanation provided

Explanation

Upstream emissions from fuels and electricity purchased by Cemig were not evaluated, as well as losses on the transmission and distribution of electricity consumed by Cemig were not accounted for. Additionally, emissions from electricity generation purchased by Cemig for resale were not assessed.
It is important to note, however, that emissions due to losses in Cemig's electricity transmission and distribution systems were accounted for in Scope 2. In addition, emissions from fossil fuel (oil) transportation from refineries to the Igarapé thermal plant were accounted for. This transport takes place by tanker trucks and has been accounted for under the line “Transport and upstream distribution”.

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO2e

673.44

Emissions calculation methodology

CEMIG's GHG Emissions Inventory was prepared via CLIMAS, a calculation software developed by WayCarbon, which has a database with up to date emission factors available for each type of source (eg Brazilian GHG Protocol Program for Brazil and, when not available, internationally

accepted references such as GHG Protocol, IPCC, EPA and DEFRA).
Generically, GHG emissions and removals are calculated for each source individually according to the following formula:
Emission = Activity_Data * Emission_Factor * Global_Heating Potential
Emission factors are based mainly on the following references: IPCC (2006), Brazilian GHG Protocol Program (2018), National Energy Balance (2015) and Ministry of Science, Technology, Innovations, and Communications (2018).

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

0

Explanation

Waste generated in operations

Evaluation status

Relevant, calculated

Metric tonnes CO2e

337.61

Emissions calculation methodology

CEMIG's GHG Emissions Inventory was prepared via CLIMAS, a calculation software developed by WayCarbon, which has a database with up to date emission factors available for each type. source (eg Brazilian GHG Protocol Program for Brazil and, when not available, internationally accepted references such as GHG Protocol, IPCC, EPA and DEFRA).
Generically, GHG emissions and removals are calculated for each source individually according to the following formula:
Emission = Activity_Data * Emission_Factor * Global_Heating Potential
Emission factors are based mainly on the following references: IPCC (2006), Brazilian GHG Protocol Program (2018), National Energy Balance (2015) and Ministry of Science, Technology, Innovations and Communications (2018).

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

0

Explanation

Business travel

Evaluation status

Relevant, calculated

Metric tonnes CO2e

689.02

Emissions calculation methodology

CEMIG's GHG Emissions Inventory was prepared via CLIMAS, a calculation software developed by WayCarbon, which has a database with the most current emission factors available for each type of source ((eg Brazilian GHG Protocol Program for Brazil and, when not available, internationally accepted references such as GHG Protocol, IPCC, EPA and DEFRA).

Generically, GHG emissions and removals are calculated for each source individually according to the following formula:

Emission = Activity_Data * Emission_Factor * Global_Heating Potential

Emission factors are based mainly on the following references: IPCC (2006), Brazilian GHG Protocol Program (2018), National Energy Balance (2015) and Ministry of Science, Technology, Innovations and Communications (2018).

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

0

Explanation

Employee commuting

Evaluation status

Relevant, calculated

Metric tonnes CO2e

111.64

Emissions calculation methodology

CEMIG's GHG Emissions Inventory was prepared via CLIMAS, a calculation software developed by WayCarbon, which has a database with the factors of most current emissions available for each source type (eg Brazilian GHG Protocol Program for Brazil and, when not available, internationally accepted references such as GHG Protocol, IPCC, EPA and DEFRA).
Generically, GHG emissions and removals are calculated for each source individually according to the following formula:
Emission = Activity_Data * Emission_Factor * Global_Heating Potential
Emission factors are based mainly on the following references: IPCC (2006), Brazilian GHG Protocol Program (2018), National Energy Balance (2015) and Ministry of Science, Technology, Innovations and Communications (2018).

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

0

Explanation

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Explanation

Cemig has no upstream leased assets. Thus, this source is not relevant to Cemig.

Downstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO2e

13,699.89

Emissions calculation methodology

CEMIG's GHG Emissions Inventory was prepared via CLIMAS, a calculation software developed by WayCarbon, which has a database with the most current emission factors available for each type of source (eg Brazilian GHG Protocol Program for Brazil and, when not available, internationally accepted references such as GHG Protocol, IPCC, EPA and DEFRA).
Generically, GHG emissions and removals are calculated for each source individually according to the following formula:
Emission = Activity_Data * Emission_Factor * Global_Heating Potential
Emission factors are based mainly on the following references: IPCC (2006), Brazilian GHG Protocol Program (2018), National Energy Balance (2015) and Ministry of Science, Technology, Innovations and Communications (2018).

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

0

Explanation

Processing of sold products

Evaluation status

Not relevant, explanation provided

Explanation

The product sold by Cemig (electricity) is not processed as an intermediate product for the production of a final consumer good; Electricity is an input in production processes, not an intermediate good. Accordingly, this source of emissions is not applicable to Cemig.

Use of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO2e

7,628,547.8

Emissions calculation methodology

CEMIG's GHG Emissions Inventory was prepared via CLIMAS, a calculation software developed by WayCarbon, which has a database up to date emission factors available for each type. source (eg Brazilian GHG Protocol Program for Brazil and, when not available, internationally accepted references such as GHG Protocol, IPCC, EPA and DEFRA).
Generically, GHG emissions and removals are calculated for each source individually according to the following formula:
Emission = Activity_Data * Emission_Factor * Global_Heating Potential
Emission factors are based mainly on the following references: IPCC (2006), Brazilian GHG Protocol Program (2018), National Energy Balance (2015) and Ministry of Science, Technology, Innovations and Communications (2018).

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

0

Explanation

End of life treatment of sold products

Evaluation status

Not relevant, explanation provided

Explanation

The product sold by Cemig (electricity) does not have an end-of-life treatment as it does not generate waste to be treated or disposed of. Thus, this source is not applicable to Cemig.

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Explanation

Cemig does not lease assets. Accordingly, this source of emissions is not applicable to the Company.

Franchises

Evaluation status

Not relevant, explanation provided

Explanation

Cemig has no franchises. Accordingly, this source of emissions is not applicable to the Company.

Investments

Evaluation status

Not relevant, explanation provided

Explanation

Investments made by Cemig do not imply increases in emissions. Accordingly, this source of emissions is not applicable to the Company.

Other (upstream)

Evaluation status

Not relevant, explanation provided

Explanation

No other relevant upstream sources have been identified.

Other (downstream)

Evaluation status

Not relevant, explanation provided

Explanation

No other relevant downstream sources have been identified.

C6.7

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

Yes

C6.7a

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

Row 1

Emissions from biologically sequestered carbon (metric tons CO2)

1,409.27

Comment

Direct CO2 emissions (Scope 1) from the energy use of renewable biomass. In the preparation of the Company's GHG inventory, the definition of renewable biomass formulated by the Clean Development Mechanism Executive Committee of the United Nations Framework Convention on Climate Change (EB 23, Annex 18) was adopted. Emissions of this nature do not contribute to the long-term increase in CO2 concentration in the atmosphere.

C6.10

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

Intensity figure

0.0000248709

Metric numerator (Gross global combined Scope 1 and 2 emissions)

553,781.2

Metric denominator

unit total revenue

Metric denominator: Unit total

22,266,217,000

Scope 2 figure used

Location-based

% change from previous year

24.29

Direction of change

Decreased

Reason for change

Cemig's scope 1 and 2 emissions decreased by 27.2% and 22.0%, respectively, compared to 2017.
This is mainly associated with a 36.8% reduction in stationary combustion emissions, as this category represents about 60% of Scope 1 emissions. 99% of stationary combustion emissions, in turn, comes from the consumption of oil at the Igarapé TPP. Emissions from fuel oil decreased by 35% compared to 2017, due to the lower activation of the Igarapé TPP, which justifies the reduction of emissions in this category.
In terms of Transmission and Distribution Losses, which represents 99.4% of Scope 2 emissions, there was a reduction of approximately 2.2% from 2018 over the previous year. In addition, in 2018 there was also a 20% reduction in the average grid emission factor over the previous year. These two factors justify the 22% reduction in GHG emissions in scope 2.
In addition, Cemig's net operating revenues increased by 2.55% in this period. Increasing the denominator value, plus the numerator value reduction contributes to the reduction of the indicator.
The value for the column “Numerator (Scopes 1 and 2 total combined gross emissions)” is 553,781 tCO2e.

Intensity figure

0.036418308

Metric numerator (Gross global combined Scope 1 and 2 emissions)

553,781.2

Metric denominator

megawatt hour generated (MWh)

Metric denominator: Unit total

15,206,121

Scope 2 figure used

Location-based

% change from previous year

0.75

Direction of change

Decreased

Reason for change

Scope 1 emission reduction is mainly associated with a 36.8% reduction in stationary combustion emissions, As this category represents about 60% of Scope 1 emissions. 99% of stationary combustion emissions, in turn, comes from oil consumption at the Igarapé TPP. Emissions from fuel oil decreased by 35% compared to 2017, due to the lower activation of the Igarapé TPP, which justifies the reduction of emissions in this category.

In terms of Transmission and Distribution Losses, which represents 99.4% of Scope 2 emissions, there was a reduction of approximately 2.2% from 2018 over the previous year. In addition, in 2018 there was also a 20% reduction in the average grid emission factor over the previous year. These two factors justify the 22% reduction in GHG emissions in scope 2.

Cemig's net generation decreased by 25.51% in 2018.

The value for the column “Numerator (Scopes 1 and 2 total combined gross emissions)” is 553,781 tCO2e.

C7. Emissions breakdowns

C7.1

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

Yes

C7.1a

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

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	30,095.56	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	222.76	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	274.22	IPCC Fourth Assessment Report (AR4 - 100 year)
SF6	4,975.87	IPCC Fourth Assessment Report (AR4 - 100 year)

C-EU7.1b

(C-EU7.1b) Break down your total gross global Scope 1 emissions from electric utilities value chain activities by greenhouse gas type.

	Gross Scope 1 CO2 emissions (metric tons CO2)	Gross Scope 1 methane emissions (metric tons CH4)	Gross Scope 1 SF6 emissions (metric tons SF6)	Gross Scope 1 emissions (metric tons CO2e)	Comment
Fugitives	0.01	6.86	0.22	5,147.38	Emissions from the Fugitive category were mainly derived from SF6 exhaust in the transmission and

	Gross Scope 1 CO2 emissions (metric tons CO2)	Gross Scope 1 methane emissions (metric tons CH4)	Gross Scope 1 SF6 emissions (metric tons SF6)	Gross Scope 1 emissions (metric tons CO2e)	Comment
					distribution systems, with the participation of this precursor of 96.7 % of total emissions in this category.
Combustion (Electric utilities)	30,018.55	1.93	0	30,277.41	Cemig's stationary and mobile combustion emissions, excluding emissions from Gasmig and Efficientia.
Combustion (Gas utilities)	71.06	0.12	0	74.09	Gasmig mobile combustion emissions.
Combustion (Other)	2.79	0	0	2.92	Efficientia mobile combustion emissions.
Emissions not elsewhere classified	3.15	0	0	66.61	Emissions from Agricultural and Land Use Change category.

C7.2

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

Country/Region	Scope 1 emissions (metric tons CO2e)
Brazil	35,568.41

C7.3

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

By business division

By activity

C7.3a

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

Business division	Scope 1 emissions (metric ton CO2e)
Cemig GT	23,733.99
Cemig D	11,573.98
Rosal Energia	7.59
Sá Carvalho Energia	4.33
Efficientia	2.92
GASMIG	245.59

C7.3c

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

Activity	Scope 1 emissions (metric tons CO2e)
Stationary combustion	21,434.25
Mobile combustion	8,920.18
Fugitive emissions	5,147.38
Agricultural and land use change	66.61

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

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

	Gross Scope 1 emissions, metric tons CO2e	Comment
Electric utility generation activities	35,568.41	Igarapé TPP (131 MW installed capacity) operates to meet the contingencies of the Brazilian Interconnected Electric System (SIN) and, in 2018, was responsible for 60% of the Scope 1 emissions from Cemig. It is important to remember that the decision of energy dispatch in Brazil (composition of hydrothermal generation each week) is made by the National Electric System Operator (ONS), based on prospective analyzes of prediction of future inflow scenarios, in the expectation of growth of the energy consumption and the definition of the expansion schedule of new plants. During periods of favorable hydrology and high levels of water storage in the system reservoirs, the decision to generate thermal power plants is minimized, prioritizing hydroelectric generation. Due to the above, there was a 27.2% reduction in total Scope 1 emissions compared to 2017 (48,849 tCO2e).

C7.5

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

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Brazil	518,212.79	0	7,004,454.12	0

C7.6

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

By business division

By activity

C7.6a

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

Business division	Scope 2, location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Cemig GT	6,067	0
Cemig D	512,113	0
Gasmig	34	0
Rosal Energia	0	0
Sá Carvalho Energia	0	0
Efficientia	0	0

C7.6c

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

Activity	Scope 2, location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Purchased electricity	3,067	0
Technical losses in the system	515,146	0

C7.9

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

Decreased

C7.9a

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

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	0	No change	0	The energy produced by CEMIG in 2018 comes from 99% of renewable sources and exported to the grid. The energy consumed by CEMIG is considered to come from the grid, so it cannot be accounted for as renewable energy purchases.
Other emissions reduction activities	99,489.26	Decreased	13.94	In 2018, 99489.26 tCO2e were reduced due to three CEMIG emission reduction initiatives. Total scope 1 and 2 emissions were 713 262 tCO2e in 2017, so they were reduced by 13.94%, calculated from (99489/713 262) * 100 = 13.94%. X = (-99489) / (48,849 + 664,413) * 100 X = - 99489 / 713,262 * 100 X = -13.94%
Divestment	63	Decreased	0.01	In the year 2018, CEMIG Telecomunicações SA was sold and its emissions were not accounted for in the 2018 inventory. To calculate the percentage of 0.01%, the scope 1 + 2 emissions related to Cemig Telecomunicações SA in 2018 are subtracted from 2017, and this total is divided by the sum of the scopes 1 + 2 2017. X = (0 - 63) / (48,849 + 664,413) * 100 X = -63 / 713,262 * 100 X = -0.01%
Acquisitions	279.11	Increased	0.04	In 2018, Cemig now holds 100% of shares of Gasmig and therefore their emissions have been included in the inventory. To calculate the 0.04% percentage, Gasmig's scope 1 + 2 emissions in 2018 are divided by the sum of the 2017 scope 1 + 2 scopes. X = (279.11) / (48,849 + 664,413) * 100 X = 279.11 / 713.262 * 100 X = 0.04%

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Mergers	0	No change	0	Cemig had no mergers in 2018, and therefore no emissions change because of this factor.
Change in output	7,043.76	Decreased	0.99	Cemig's electricity production decreased from 19,731,632 MWh in 2017 to 14,698,565 MWh in 2018, representing a 25% reduction. This reduction is due to the losses from the concessions of the São Simão, Jaguara, Miranda and Volta Grande plants. The operating units responsible for the power generation activities, whose emissions were included in the inventory calculations, are Cemig GT, the Rosal and Sá Carvalho plants. The sum of Scope 1 and 2 emissions from these three operating units in 2018 was 29,812.24 tCO2e, compared to 36,856 tCO2e in 2017. To calculate the percentage of 0.99%, subtract Scope 1 + 2 emissions relative to Cemig GT, Rosal and Sá Carvalho operating units in 2018 by 2017, and this total is divided by the sum of the 1 + 2 scopes of 2017. X = (29,812.24 - 35,856) / (48,849 + 664,413) * 100 X = -7.043.76 / 713.262 * 100 X = -0.99%
Change in methodology	198.43	Decreased	0.03	The 22% reduction in Scope 2 emissions is mainly due to the 20% reduction in the emission factor. National Interconnected System (SIN) emission, from 0.0927 tCO2/ MWh in 2017 to 0.0742 tCO2/ MWh in 2018. It is then considered that 20% of the reduction in emissions from electricity consumption is justified by the reduction of the average grid emission factor. This represents 198.43 tCO2e, calculated as follows: Electricity consumption emissions in 2017: 4,059 tCO2e Electricity consumption emissions in 2018: 3,066.84 tCO2e

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
				2018 reduction: 992,16 tCO2e Reduction in 2018 due to change in fact Emission: 20% * 992.16 = 198.43 tCO2e. To calculate the percentage of 0.03% presented in the adjacent column, the reduced emissions due to the change in the average grid emission factor are divided by the 2017 scope 1 + 2. X = -198.43 / (48,849 + 664,413) * 100 X = -198,43 / 713,262 * 100 X = -0,03%
Change in boundary	0	No change	0	Cemig had no changes in boundary in 2018, and therefore no emissions change because of this factor.
Change in physical operating conditions	12,625.76	Decreased	1.77	Emissions associated with the Igarapé TPP operation in 2018 were 21,220.24 tCO2e tCO2and, in 2017 these emissions were 33,846 tCO2e, due to the higher dispatch of the power generation plant. The dispatch of the thermal plant is associated with the weather conditions, since years with higher precipitation volume are characterized by lower thermal power generation and higher hydroelectric power generation. The reduction in the operation of the Igarapé TPP accounted for a 1.77% reduction in Scope 1 + 2 emissions in 2018 compared to 2017. To calculate the percentage of 1.77%, the scope 1 emissions are subtracted. the Igarapé TPP in 2018 by 2017, and this total is divided by the sum of the 1 + 2 scopes of 2017. X = (21,220.24 - 33,846) / (48,849 + 664,413) * 100 X = -12,625.76 / 713,262 * 100 X = -1.77%
Unidentified	0	No change	0	All reasons for any change in gross global emissions were accounted for.

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Other	145,861.82	Decreased	20.45	In 2018, emissions from transmission and distribution losses decreased by 20.36%, representing 145,208 tCO2e. This reduction is justified by Cemig's improvement in the recognition of technical regulatory losses, the improvement and reinforcement of the electric system. Between 2018 and 2023, investments of R$4.5 billion in the electric system are foreseen. Other different factors led to less significant changes in 2018 emissions, which, when added together, are responsible for the reduction of 653.82 tCO2e, which represents 0.09% of the scope 1 + 2 emission reduction. These factors include: (i) logistical optimization measures, fleet management and renewal, and reduction in runways (-1,127.82 tCO2e); (ii) increased replacement of SF6 (+366.38 tCO2e); (iii) reduction of activities include the use of fertilizers, such as production of native and other seedlings for urban afforestation, riparian forest planting and as nutrients used for fish farming (-11.39 tCO2e); and (iv) increased use of forklifts, autoclaves and emergency generators (+119.01 tCO2e). To calculate the percentage of 20.45, the sum of the changes in emissions from the above causes was divided by the scope 1 + 2 emissions of 2017. X = (-145.208 + -653.82) / (48,849 + 664,413) * 100 X = -145,861.82 / 713,262 * 100 X = -20.45%

C7.9b

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

Location-based

C8. Energy

C8.1

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

More than 55% but less than or equal to 60%

C8.2

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

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

C8.2a

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

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total MWh
Consumption of fuel (excluding feedstock)	LHV (lower heating value)	1,573.76	113,861.21	115,434.97
Consumption of purchased or acquired electricity		0	7,004,454.12	7,004,454.12

Consumption of self-generated non-fuel renewable energy		0		0
Total energy consumption		1,573.76	7,118,315.33	7,119,889.09

C8.2b

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

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

C8.2c

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

Fuels (excluding feedstocks)

Diesel

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

29,930.74

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Fuels (excluding feedstocks)

Motor Gasoline

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

6,352.23

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Fuels (excluding feedstocks)

Liquefied Petroleum Gas (LPG)

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

5.78

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Fuels (excluding feedstocks)

Natural Gas

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

54.51

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Fuels (excluding feedstocks)

Natural Gas Liquids (NGL)

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

353.81

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Fuels (excluding feedstocks)

Jet Kerosene

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

1,256.73

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Fuels (excluding feedstocks)

Residual Fuel Oil

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

75,907.41

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Fuels (excluding feedstocks)

Other, please specify

Hydrous ethanol

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

1,573.76

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

C8.2d

(C8.2d) List the average emission factors of the fuels reported in C8.2c.

Diesel

Emission factor

2.64659

Unit

metric tons CO2e per m3

Emission factor source

Brazilian GHG Protocol Program.

Comment

This average emission factor takes into account the factors for the mobile and stationary combustion categories.

Jet Kerosene

Emission factor

2.54081

Unit

metric tons CO2e per m3

Emission factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Comment

This emission factor was used for the calculation of mobile combustion emissions.

Liquefied Petroleum Gas (LPG)

Emission factor

3.06076

Unit

metric tons CO2e per metric ton

Emission factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Comment

This emission factor was used for the calculation of mobile combustion emissions.

Motor Gasoline

Emission factor

1.73768

Unit

metric tons CO2e per m3

Emission factor source

Brazilian GHG Protocol Program

Comment

This emission factor was used to calculate mobile combustion emissions.

Natural Gas

Emission factor

0.00199

Unit

metric tons CO2e per m3

Emission factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Comment

This emission factor was used for the calculation of stationary combustion emissions.

Natural Gas Liquids (NGL)

Emission factor

0.00207

Unit

metric tons CO2e per m3

Emission factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

This emission factor was used for the calculation of mobile combustion emissions.

Residual Fuel Oil

Emission factor

3.13721

Unit

metric tons CO2e per metric ton

Emission factor source

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment

This emission factor was used for the calculation of stationary combustion emissions.

Other

Emission factor

0.00146

Unit

metric tons CO2 per liter

Emission factor source

Brazilian GHG Protocol Program.

Comment

This emission factor was used for the calculation of mobile combustion emissions.

C8.2e

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

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	15,206,121	0	15,182,833	0
Heat	0	0	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C-EU8.2e

(C-EU8.2e) For your electric utility activities, provide a breakdown of your total power plant capacity, generation, and related emissions during the reporting year by source.

Coal – hard

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Lignite

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Oil

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Gas

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Biomass

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Waste (non-biomass)

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Nuclear

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Geothermal

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Hydroelectric

Nameplate capacity (MW)

5,883

Gross electricity generation (GWh)

14,856.27

Net electricity generation (GWh)

14,353.88

Absolute scope 1 emissions (metric tons CO2e)

2,334.79

Scope 1 emissions intensity (metric tons CO2e per GWh)

0.16

Comment

Emissions intensity was calculated by dividing Scope 1 emissions from Cemig GT (excluding Igarapé TPP emissions), Rosal HPP and Sá Carvalho HPP by net hydroelectric power generation.

Wind

Nameplate capacity (MW)

115

Gross electricity generation (GWh)

324,978

Net electricity generation (GWh)

320,175

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Emissions that may be related to the operation of Cemig's wind plants were accounted for under hydroelectric sources.

Solar

Nameplate capacity (MW)

1

Gross electricity generation (GWh)

1,586

Net electricity generation (GWh)

1,563

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Emissions that may be related to the operation of Cemig's solar plants were accounted for under hydroelectric sources.

Other renewable

Nameplate capacity (MW)

0

Gross electricity generation (GWh)

0

Net electricity generation (GWh)

0

Absolute scope 1 emissions (metric tons CO2e)

0

Scope 1 emissions intensity (metric tons CO2e per GWh)

0

Comment

Other non-renewable

Nameplate capacity (MW)

131

Gross electricity generation (GWh)

23,288

Net electricity generation (GWh)

22,944

Absolute scope 1 emissions (metric tons CO2e)

21,411.13

Scope 1 emissions intensity (metric tons CO2e per GWh)

933.19

Comment

Emissions intensity was calculated by dividing Scope 1 emissions from TPP Igarapé by net energy generation from TPP Igarapé.

Total

Nameplate capacity (MW)

6,130

Gross electricity generation (GWh)

15,206.12

Net electricity generation (GWh)

14,698.56

Absolute scope 1 emissions (metric tons CO2e)

35,568.41

Scope 1 emissions intensity (metric tons CO2e per GWh)

2.42

Comment

The emission intensity was calculated by dividing the total Scope 1 emissions of the total net power generation.

C8.2f

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

Basis for applying a low-carbon emission factor

No purchases or generation of low-carbon electricity, heat, steam or cooling accounted with a low-carbon emission factor

Low-carbon technology type

Region of consumption of low-carbon electricity, heat, steam or cooling

MWh consumed associated with low-carbon electricity, heat, steam or cooling

Emission factor (in units of metric tons CO2e per MWh)

Comment

In 2018, 99% of the electricity generated by Cemig came from renewable sources, including hydroelectric, wind and solar, representing 14,675,621 MWh of renewable energy generated and injected into the grid. All the electricity consumed by Cemig comes from the grid, and it is not possible to say with certainty the percentage of energy from renewable sources associated with a low carbon emission factor.

C-EU8.4

(C-EU8.4) Does your electric utility organization have a transmission and distribution business?

Yes

C-EU8.4a

(C-EU8.4a) Disclose the following information about your transmission and distribution business.

Country/Region

Brazil

Voltage level

Transmission (high voltage)

Annual load (GWh)

0

Scope 2 emissions (basis)

Location-based

Scope 2 emissions (metric tons CO2e)

6,066.63

Annual energy losses (% of annual load)

0

Length of network (km)

4,931

Number of connections

38

Area covered (km2)

567,740

Comment

Scope 2 emissions are related to losses in power transmission by Cemig GT, and the number of connections was reported as the number of transmission network substations.

Country/Region

Brazil

Voltage level

Distribution (low voltage)

Annual load (GWh)

51,526

Scope 2 emissions (basis)

Location-based

Scope 2 emissions (metric tons CO2e)

512,112.64

Annual energy losses (% of annual load)

13.28

Length of network (km)

532,569

Number of connections

8,409,044

Area covered (km2)

567,740

Comment

The annual load is calculated by the balance of energy injected into the network by Cemig D; losses were calculated as the difference between injected energy and total market requirement (captive + free), and scope 2 emissions include Cemig D's “electricity purchase” and “transmission and distribution losses” categories.

C9. Additional metrics

C9.1

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

Description

Other, please specify

Scope 1 emission per MWh produced (tCO2/ MWh)

Metric value

0

Metric numerator

Direct emissions (Scope 1)

Metric denominator (intensity metric only)

Net energy generation measured in MWh

% change from previous year

2.3

Direction of change

Decreased

Please explain

The intensity of direct emissions is calculated by dividing Scope 1 emissions by Cemig's net energy generation. This intensity is directly influenced by the fuel oil consumption in the dispatch of the Igarapé TPP (responsible for most of the Company's scope 1 emissions) and by Cemig's net energy generation.

In 2018, Cemig's net energy production decreased by 26% compared to 2017 (from 19,731,632 MWh to 14,698,565 MWh). In addition, Cemig's representation of the thermal plant in net power generation decreased from 0.2% in 2017 to 0.16% in 2018, resulting in a reduction in emissions intensity.

C-EU9.5a

(C-EU9.5a) Break down, by source, your total planned CAPEX in your current CAPEX plan for power generation.

Primary power generation source	CAPEX planned for power generation from this source	Percentage of total CAPEX planned for power generation	End year of CAPEX plan	Comment
Hydroelectric	261,000,000	64	2023	In Capex Annual Plan (2019 -2023) R$261,000,000.00 are foreseen for investments in this source of energy. In 2019, R$30,000,000.00 of investment is foreseen in operation and maintenance of hydroelectric plants and contributions of R$46,000,000.00.
Biomass	83,000,000	20	2023	The Capex Annual Plan (2019-2023) includes investments of R$83,000,000.00 in this source of energy. In 2019, R$8,000,000.00 is expected to be invested in biomass cogeneration projects that will be developed by Efficientia.
Solar	62,000,000	15	2023	The Capex Annual Plan (2019-2023) includes investments of R$62,000,000.00 in this energy supply. The projects are being developed by Cemig GD.

C-EU9.5b

(C-EU9.5b) Break down your total planned CAPEX in your current CAPEX plan for products and services (e.g. smart grids, digitalization, etc.).

Products and services	Description of product/service	CAPEX planned for product/service	Percentage of total CAPEX planned products and services	End of year CAPEX plan
Other, please specify Planned Capex for Renewable Energy Development	In the current Capex Plan (2019- 2023) substantial investments are foreseen in Cemig GT, where 98% of the electricity is generated from renewable sources. Source: APIMEC Presentation - Guidance 2019-2023, available at: http://cemig.infoinvest.com.br/en/17626/XXIV%20Meeting%20Anual_2019_projees.pdf	1,876,000,000	1	2023
Other, please specify Planned Capex for improvement in distribution services	Capex's current plan (2019-2023) includes substantial investments in the Distribution business in the following products and services: - Distributed generation - Information campaigns - Energy management services - Smart grid Source: APIMEC Presentation - 2019-2023 Guidance, available at: http://cemig.infoinvest.com.br/enb/17626/XXIV%20Meeting%20Anual_2019_projees.pdf	6,458,000,000	45	2023
Other, please specify Transmission	Cemig GT's investment program for transmission over the next 5 years amounts to over R$1.1 billion and with the guarantee of resources based on the amounts that are being received as transmission compensation, by the terms of Law 12,783 / 13 (MP 579).	1,450,000,000	10	2022

Products and services	Description of product/service	CAPEX planned for product/service	Percentage of total CAPEX planned products and services	End of year CAPEX plan
Other, please specify Transmission and distribution	Cemig D has planned investments in accordance with the Distributor Development Plan - PDD, in the period from 2018 to 2022, in the amount of R$4,498 million, as of June 30, 2017, aiming at the execution of high, medium and low voltage works in the electrical system for expansion and reinforcement, operation and maintenance, renovation, customer service, metering exchange, environment, third party safety and telecommunications.	4,498,000,000	31	2022

C-CO9.6/C-EU9.6/C-OG9.6

(C-CO9.6/C-EU9.6/C-OG9.6) Disclose your investments in low-carbon research and development (R&D), equipment, products, and services.

Investment start date

January 1, 2018

Investment end date

December 31, 2018

Investment area

R&D

Technology area

Renewable energy

Investment maturity

Applied research and development

Investment figure

12,438,073.14

Low-carbon investment percentage

21-40%

Please explain

The researched and developed themes are: Information Science applied to decision making in renewable energy (R&D 553); Cogeneration in the cement sector (R&D 554); Wind forecasting models (R&D 555); Appropriate Regulatory Model for implementation of Distributed Mini and Micro Generation with preservation of the Distributor's Required Revenue and for the benefit of society (R&D 586); Veredas Sol e Lares - Economic and social development in the semi-arid state of Minas Gerais from the mobilization, empowerment and participation of the populations for the use of distributed photovoltaic hybrid generation in the revitalization of water projects (R&D 632); Decentralized electricity generation from carbonization waste gases (R&D 643); Strategic Project: Technical and Commercial Arrangements for Inserting Photovoltaic Solar Generation in the Brazilian Energy Matrix - Proposal Cemig, Efficientia and UFMG (R&D 713).
The % reported in the adjacent column refers to the total R&D investment in relation to the total invested in R&D by Cemig, according to information in the Aneel Report (worksheets GT and D).

C10. Verification

C10.1

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

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

	Verification/assurance status
Scope 3	Third-party verification or assurance process in place

C10.1a

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

Scope

Scope 1

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Attach the statement

BVC-statement english.pdf

Page/ section reference

Page 1

Relevant standard

Other, please specify

ISO14064-1

Proportion of reported emissions verified (%)

100

Scope

Scope 2 location-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Attach the statement

BVC-statement english.pdf

Page/ section reference

Page 1

Relevant standard

Other, please specify

ISO14064-1

Proportion of reported emissions verified (%)

100

C10.1b

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

Scope

Scope 3- all relevant categories

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Attach the statement

BVC-statement english.pdf

Page/section reference

Page 1

Relevant standard

Other, please specify

ISO14064-1

C10.2

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

Yes

C10.2a

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

Dec Asseg CEMIG GRI 2019_v0_ ING.pdf

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C0. Introduction	Other, please specify Overview and introduction, reporting year, consolidated reporting approach, organizational activities	The independent annual verification of Cemig's Sustainability Report is based on the best practices set forth in the GRI Standards for Sustainability Reporting Principles and the standard of assurance. ISAE3000.	Annually, Cemig submits its Sustainability Report to independent verification to ensure the legitimacy of its content. The audit process comprised (i) the review of disclosures, information and data present in a preliminary version of the sustainability report (ii) interviews with strategic employees, both to understand the report data and to understand the management processes involved with the employees material topics and (ii) review of complementary documentation sent by CEMIG to SGS. General company data and the reporting approach are presented in Cemig's sustainability report and are therefore subject to verification.
C2. Risks and opportunities	Other, please specify Time horizons, types of risk	The independent annual verification of Cemig's Sustainability Report is based on the best practices set forth in the GRI Standards for Sustainability Reporting Principles and the ISAE3000 assurance standard.	Annually, Cemig submits its Sustainability Report to independent verification to ensure the legitimacy of its content. The audit process comprised (i) the review of disclosures, information and data present in a preliminary version of the sustainability report (ii) interviews with strategic employees, both to understand the report data and to understand the management processes involved with the employees material topics and (ii) review of

Disclosure module verification relates to	Data verified	Verification standard	Please explain
			complementary documentation sent by CEMIG to SGS. In the Sustainability Report, chapter on Climate Change, the time horizons considered by the Company in its risk assessments are presented, as well as some examples of identified climate risks.
C3. Business strategy	Renewable energy products	Cemig's independent annual verification of its Sustainability Report is based on the best practices set out in the GRI Standards for Sustainability Reporting and the ISAE3000 assurance standard.	Annually, Cemig submits its Sustainability Report to independent verification to ensure the legitimacy of its content. The audit process is comprised by (i) the review of disclosures, information and data presented in a preliminary version of the sustainability report (ii) interviews with strategic employees, both to understand the report data and to understand the management processes involved with the employees material topics and (ii) review of complementary documentation sent by CEMIG to SGS. In the Sustainability Report, Cemig presents strategic decisions made in 2018 by Cemig, influenced by business opportunities, enhanced by climate change. Among which: • Cemig's Acting as a marketer of renewable energy (wind and solar), as performance in Encouraged Power Purchase Auction Solar and Wind; • Consolidation of Cemig in the distributed generation business, through the formation of the wholly owned subsidiary Cemig Geração Distribuída SA - Cemig GD; • Restructuring of Cemig's R&D program based on Cemig's Strategic Digital Technology Innovation Plan, giving rise to the Cemig 4.0 Program.

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C4. Targets and performance	Progress against emissions reduction target	Independent annual verification of Cemig's Greenhouse Gas Emissions Inventory is based on ISO 14064-3.	Every year Cemig submits its Corporate GHG Inventory for independent verification. The purpose of third-party verification of inventory is to obtain an independent statement on the quality of the inventory and the consistency of the information contained in it to ensure that its users are accurately assessed on the organization's value chain emissions standard. Progress on emissions reduction targets and the rationale for such performance is reported in Cemig's Inventory.
C5. Emissions performance	Other, please specify Standards, protocols and methodologies used in the calculation of Scope 1 and 2 emissions	Independent annual verification of Cemig's Greenhouse Gas Emissions Inventory is based on ISO 14064-3.	Every year Cemig submits its Corporate GHG Inventory for independent verification. The purpose of third-party verification of inventory is to obtain an independent statement on the quality of the inventory and the consistency of the information contained in it to ensure that its users are accurately assessed on the organization's value chain emissions standard. References and methodology used for inventory preparation are presented in the report and are therefore subject to verification.
C7. Emissions breakdown	Year on year change in emissions (Scope 1 and 2)	The independent annual verification of Cemig's Greenhouse Gas Emissions Inventory is based on ISO 14064-3.	Every year Cemig submits its Corporate GHG Inventory for independent verification. The purpose of third-party verification of inventory is to obtain an independent statement on the quality of the inventory and the consistency of the information contained in it to ensure that its users are accurately assessed on the organization's value chain emissions standard. In the GHG inventory, Cemig's emissions in 2018 are compared to those of 2017 and 2014 (base year).

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C7. Emissions breakdown	Year on year change in emissions (Scope 3)	The independent annual verification of Cemig's Greenhouse Gas Emissions Inventory is based on ISO 14064-3.	Every year Cemig submits its Corporate GHG Inventory for independent verification. The purpose of third-party verification of inventory is to obtain an independent statement on the quality of the inventory and the consistency of the information contained in it to ensure that its users are accurately assessed on the organization's value chain emissions standard. In the GHG inventory, Cemig's emissions in 2018 are compared to those of 2017 and 2014 (base year).
C8. Energy	Other, please specify Energy Consumption	Independent annual verification of Cemig's Greenhouse Gas Emissions Inventory is based on ISO 14064-3.	Every year Cemig submits its Corporate GHG Inventory for independent verification. The purpose of third-party verification of inventory is to obtain an independent statement on the quality of the inventory and the consistency of the information contained in it to ensure that its users are accurately assessed on the organization's value chain emissions standard. Energy consumption data are used in Cemig's GHG emissions calculations and are therefore subject to verification.

C11. Carbon pricing

C11.1

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

No, but we anticipate being regulated in the next three years

C11.1d

(C11.1d) What is your strategy for complying with the systems in which you participate or anticipate participating?

In Brazil there is no carbon taxation system. However, Cemig is preparing to act in accordance with a possible carbon pricing system in Brazil by participating in the Emissions Trading System Simulation project, an initiative of the Center for Sustainability Studies (GVces) of Getulio Vargas Foundation School of Business Administration in São Paulo (EAESP / FGV). The objective of this project is to generate knowledge within the business sector about the functioning of an emissions trading system (SCE), one of the main economic instruments of greenhouse gas emission mitigation policies, already implemented in several countries. With this project, Cemig is having the opportunity to:

• Participate in training and capacity building meetings on the topic and debate on the relationship of the agenda with business strategy, and exchange experience with other companies on learnings, challenges and opportunities;

• Operate on the emissions trading platform - learning to reconcile emissions management and market strategy;

• Participate in sector benchmarking exercises based on carbon intensity indicators;

• Receive support for the internalization of the theme in the company's business agenda and for the involvement of the financial area.

In addition, the Simulation participates in the PMR Brazil Project Advisory Committee, which studies the paths to carbon pricing in Brazil. In 2019, the Ministry of Finance, through the PMR Brazil Project, will present a white paper with proposals for carbon pricing instruments for the country. Given a scenario of political uncertainty with the new federal government, it is not known whether carbon pricing will be carried forward. Cemig monitors the issue with a view to preparing for the entry into force of carbon taxation regulations in the coming years.

C11.2

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

No

C11.3

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

Yes

C11.3a

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

Objective for implementing an internal carbon price

Navigate GHG regulations
Drive low-carbon investment
Identify and seize low-carbon opportunities

GHG Scope

Scope 1

Application

Cemig, through the IS-56 Service Instruction (“Carbon Risk Assessment in Due Diligence Operations”), has established the procedures for carbon risk analysis in the conduct of due diligence conducted by the Company, regarding the acquisition, merger, and deployment of new assets using fossil fuels for power generation.
The objective is to evaluate the impact of Greenhouse Gas (GHG) emissions on Cemig's businesses arising from the purchase of assets in operation or in the project or construction phase, as well as the risks and opportunities related to climate change and the needs of mitigation of their effects on the company.

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

25.51

Variance of price(s) used

The internal price of carbon used in the analysis is based on a basket of carbon price values that considers the following parameters: (i) geographical location, based on prices in countries in the same region of Brazil (Latin America) and (ii) sector parameter, based on the prices charged by companies in the same sector as Cemig (Brazilian companies and from other countries). The estimated value of this new methodology is U$$ 6.54/tCO2.

Type of internal carbon price

Shadow price

Impact & implication

When assessing the acquisition, merger or implementation of fossil fuel ventures, Cemig conducts an internal analysis of the carbon risk and its financial impact on the company.
In 2018, the new strategic planning cycle (2019 to 2025) was approved with the medium and long-term guideline (2021-2040) of expanding the solar, wind and thermal generation capacity to natural gas. At this time, the company is evaluating opportunities for these investments and, as a criterion for business viability analysis, the carbon risk assessment defined in the Service Instruction (IS-56) “Carbon Risk Assessment in Due Diligence Operations” will be used.
It is noteworthy that the short-term initiative (2019-2020) for the decommissioning of the Igarapé thermal plant (the only plant in the company that uses fuel oil) was also approved in the Strategic Planning, given the high costs of operating and maintaining this plant, beyond the risk of future carbon taxation.

C12. Engagement

C12.1

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

Yes, our customers
Yes, other partners in the value chain

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement

Education/information sharing

Details of engagement

Run an engagement campaign to educate customers about the climate change impacts of (using) your products, goods, and/or services

% of customers by number

33.56

% Scope 3 emissions as reported in C6.5

33.49

Please explain the rationale for selecting this group of customers and scope of engagement

Cemig develops several actions to raise awareness of energy use with the goal of reducing waste and spreading energy efficiency. Together with its residential, services and commercial customers, the Company promotes several awareness campaigns on the efficient use of electricity. These campaigns run on various media - television, radio, newspapers, internet, social networks and also on energy bills sent to customers.

According to the regulation of the energy efficiency program, 80% of the resources of the theme are applied to low-income consumers. To define which consumers receive the engagement actions, the company considers criteria such as Human Development Index of the municipality, the poorest regions of these municipalities (clusters, communities and occupations and customer income (lower income has priority).

Impact of engagement, including measures of success

The impact of this engagement strategy is to increase the rational use of energy by the Company's customers. The measurement of results is performed by the positive feedback received from customers reporting the savings to the information received on the rational use and environmental benefits of this initiative.

The tangibility of this strategy is measured through the energy savings of Cemig's Energy Efficiency Program customers, and in 2018 R$ 47.05 million was invested in the implementation of new technologies and the strengthening of the culture of rational use of energy through awareness and more efficient equipment. Energy efficiency includes low-income families, hospitals, non-profit entities, rural residents, educational institutions and public agencies, achieving savings of 1,288,015 MWh.

Type of engagement

Collaboration & innovation

Details of engagement

Other – please provide information in column 5

% of customers by number

31.84

% Scope 3 emissions as reported in C6.5

31.78

Please explain the rationale for selecting this group of customers and scope of engagement

Cemig promotes engagement actions with the Minas Gerais Industries Union via a partnership with the Federation of MG Industries (FIEMG). FIEMG's executive energy advisory sends questionnaires to trade unions, which in turn sends them to small and medium-sized associated industries. Industries answer the questionnaire, and the executive energy advisory reviews, guides, and diagnoses for unions to pass on opportunities to reduce energy costs to the industry. Given the options presented, the industry chooses the one that best suits it and may enter into a contract with Cemig GD.

Impact of engagement, including measures of success

This engagement is expected to result in a 15% reduction in energy costs without the need for investments by companies. Impacts will be measured by the number of contracts entered into with Cemig GD.

C12.1c

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

Cemig promotes the engagement of its employees (own and third parties) through internal campaigns on the rational use of energy within the Company's facilities, correlating energy efficiency with GHG emission reduction, in the same line of approach adopted with its customers. Internal campaigns are carried through the display of banners and posters at Cemig headquarters and offices throughout the state and digital media in existing communication channels, such as login screen, Intranet, Cemig Online and Energia da Gente Cemig (a newsletter aimed at the internal public).

In addition, in 2017 Cemig promoted the Ideia Illuminated Contest, which aimed to promote solutions aimed at reducing fuel consumption, energy efficiency, water consumption and waste generation reduction. Of the 44 projects submitted by Cemig employees, the first to be implemented was a rainwater harvesting system for the Company's main building in the Vila Mariana neighborhood of Governador Valadares. The project was inaugurated in December 2018 and its results were published in an internal publication in recognition of the work done.

C12.3

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

Direct engagement with policy makers
Trade associations
Funding research organizations

C12.3a

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

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
Other, please specify Climate change mitigation and adaptation	Support	Belo Horizonte City Hall, concerned with establishing local mitigation and adaptation policies for climate change effects, has set up the Municipal Committee on Climate Change and Climate Change. Ecoefficiency-CMMCE, through the Municipal Decree nº 12.362 of 05/03/2006. The CMMCE is a collegiate and consultative body that aims to support the implementation of the municipal policy of the city of Belo Horizonte for climate change, acting in the articulation of public policies and private initiative aimed at reducing greenhouse gas emissions greenhouse and air pollutants, reduction of solid waste production and greater efficiency in waste reuse and recycling processes; encouraging the use of renewable energy sources, improving energy efficiency and rational use of energy and increasing citizens' environmental awareness. It is made up of representatives of the Municipal and State Government, civil society, non-governmental organizations and the business and academic sector, which guarantees the legitimacy of the participation of the population in various decisions related to the search for environmental sustainability in the Municipality. Thus, the role of the CMMCE is to propose and deliberate on municipal climate protection policies and to raise awareness and mobilize society for discussion and position on the problems arising from climate change in our municipality, with a view to inclusive and sustainable	Cemig supports this legislation without reservations.

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
		development and enhancing the quality of life of all citizens. Cemig participates in the CMMCE Belo Horizonte meetings and, in 2018, contributed to the preparation of the proposal of the new municipal law on coping with climate change.	
Other, please specify Climate change mitigation and adaptation	Support	The Betim Municipal Climate Change and Eco-Efficiency Committee (CMMCE) acts to discuss public policies and private initiative by proposing changes in attitudes that reduce greenhouse gas emissions and air pollutants, in addition to the reduction of solid waste production and, thus, its reuse and recycling. The committee promotes actions to reinforce the incentive for the use of renewable energy sources, to promote the rational use of energy and, consequently, to raise citizens' environmental awareness. Cemig's engagement with CMMCE Betim is through the company's participation in meetings.	Cemig supports this legislation without reservations.

C12.3b

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

Yes

C12.3c

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

Trade association

Brazilian Business Council forSustainable Development (CEBDS)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Within CEBDS is the Thematic Chamber of Energy and Climate Change (CTClima), in which Cemig has a chair. CTClima represents CEBDS Member Companies' vision on climate change issues, public policy debates and formulation with governments and other stakeholders.
CTClima's mission is "to be an appropriate forum for companies to understand their role in the context of climate change, helping them to develop strategies that take advantage of opportunities and minimize risks and prepare them for a world with restrictions on greenhouse gas emissions and greenhouse effects.
CEBDS promotes various activities related to the theme, which can contribute to the elaboration and improvement of public policies regarding this theme. In 2018, the topic of carbon pricing was widely discussed at CEBDS.

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

Cemig's representative at the Thematic Chamber of Energy and Climate Change (CTClima) participates in meetings, discussions, debates and contributes, when applicable, with suggestions for the formulation of public policies.

C12.3d

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

Yes

C12.3f

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

Cemig's institutional relationship with public policy makers regarding climate change is conducted under the approval of the Executive Board, the managing superintendents of the specific strategic objective and the corporate risk associated with the theme. These Superintendencies receive updates on the Company's Strategy and Master Plan during the annual Strategic Planning cycle. As described in question C1.1a, the head of Cemig's Global Climate Change Strategy is the Vice President Director. Therefore, all direct and indirect activities in which the Company participates in relation to the development of public policies are ultimately evaluated by its team, after approval by the respective Director of the responsible area.
In the CEBDS (Brazilian Business Council for Sustainable Development) Leaders Council, for example, Cemig is represented by its Vice-President Director, who shares the Company's vision with other leaders of large Brazilian corporations, with the government of different spheres and society. The

participation of the Vice President Director on the Board of Leaders ensures the consistency of the company's activities with the global climate change strategy. In addition, as a basic premise, the conduct of all Cemig's institutional activities follows the guidelines of the document 10 Climate Initiatives.

C12.4

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

Publication

In mainstream reports

Status

Complete

Attach the document

RAS 2018, Climate Change Chapter.pdf

Page/Section reference

RAS 2018, Climate Change chapter.

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment

Publication

In other regulatory filings

Status

Complete

Attach the document

20-F_2018 Cemig (1).pdf

Page/Section reference

Form 20-F.

Content elements

Governance
Strategy
Risks & opportunities
Other metrics

Comment

Publication

In voluntary communications

Status

Complete

Attach the document

Cemig_Greenhouse Gas Inventory (2018).pdf

Page/Section reference

Greenhouse Gas Inventory (2018).

Content elements

Emissions figures
Emission targets
Other metrics

Comment

C14. Signoff

C-FI

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

C14.1

(C14.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	Executive Director (CEO)	Chief Executive Officer (CEO)