Greenhouse Gas Inventory
Year 2015

Cemig - Companhia Energética de Minas Gerais

Summary

1. Cemig

In 2015, Cemig completed 63 years of operation. Since its founding, on May 22nd, 1952, the Company assumed the role of bringing collective well-being to the regions where it operates, in an innovative and sustainable manner. This determination led it to the condition of largest power distributor in extension of lines and grids, being one of the largest companies of power generation and transmission in the country.

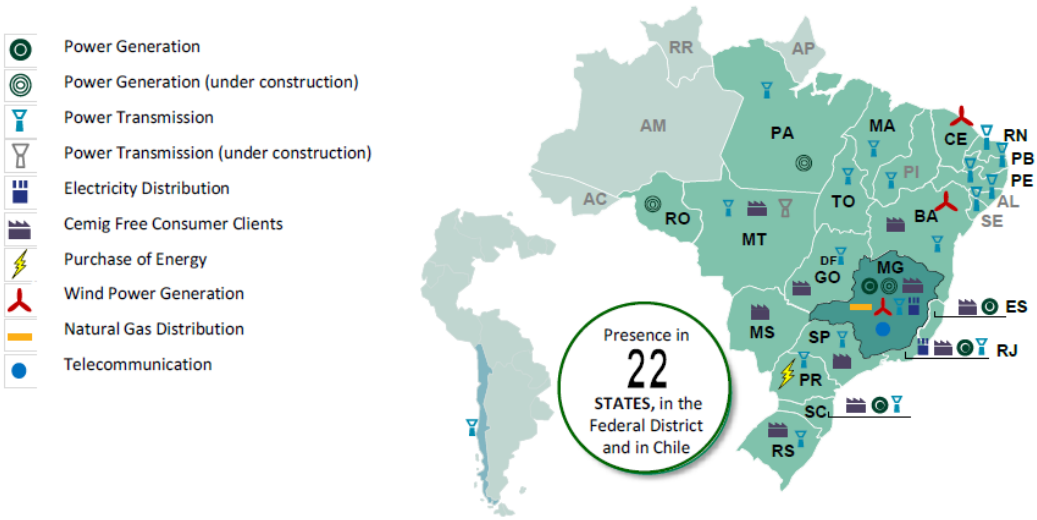
The Company operates in areas of natural gas exploration and distribution, and data transmission, but the main areas of Cemig's business are the generation, transmission and distribution of electric energy, and energy solutions (Table 1).

Table 1 - Main areas of Cemig's business

				
Generation	**Transmission**	**Distribution**	**Gas**	**Commercialization**
Installed capacity: 7,800 MW	Extension of lines: 9,748 km	Extension of grids: 494,550 km	1,440 million m^3 of gas sold	22% of market share

Cemig counts on 7,860 direct employees (base December 2015). The group consists of the holding company, Companhia Energética de Minas Gerais - Cemig, the wholly-owned subsidiaries Cemig Geração e Transmissão S.A. (Cemig GT) and Cemig Distribuição S.A. (Cemig D), totalling 218 Companies, 18 Consortiums, and 2 FIPs (Equity Investment Funds), resulting in assets present in 23 Brazilian States (including the Federal District) and in Chile. Figure 1 shows the location of Cemig's activities, according to the main segments of activity.

Figure 1: Map of geographic location of the Company's main activities



For more detailed description of Cemig's business, access here.

See the full organizational chart of the Cemig Group companies.

2. About the inventory

In accordance with guidelines of the corporate document "Commitment to Climate Changes", Cemig invests in initiatives that position itself positively in the efficient management of its impacts and its exposure to the risks of global climate change. Thus, in its strategy, the Company includes actions and initiatives necessary for prevention and minimization of impacts resulting from its activities; develops measures for adapting to climate change, aiming to minimize its risks, broadly communicating and disclosing, to society and to shareholders, the issues related to the topic. In this sense, Cemig quantifies its emissions and makes public, for the fifth consecutive time, its Greenhouse Gas Inventory, recognizing its share of responsibility on the topic and identifying opportunities to reduce emissions and costs, properly managing its risks related to climate change. It is emphasized that these last five inventories underwent an independent verification conducted, in this case, by the Bureau Veritas Certification (Annex 1 - Verification Statement, page 30).

The present inventory performed for the year of 2015 has been prepared according to these guidelines:

- ABNT NBR ISO 14064-1 - Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.
- Specifications of the GHG Protocol Brazilian Program - Accounting, Quantification and Publishing Corporate Inventories of Greenhouse Gas Emissions - Second Edition.
- Intergovernmental Panel on Climate Change (IPCC) 2006, 2007, IPCC Guidelines for National Greenhouse Gas Inventories, prepared by the National Greenhouse Gas Inventories Program.
- “The Greenhouse Gas Protocol - a Corporate Accounting and Reporting Standard” - Revised edition.
- Corporate Value Chain (Scope 3) Accounting and Reporting Standard - Supplement to the GHG Protocol Corporate Accounting and Reporting Standard (WRI / WBCSD).

3. Methodology applied

For the calculation of GHG emissions, the “Estimating tool of greenhouse gases for intersectorial sources” was used (GHG Protocol Tool) - Brazilian version, “Ferramenta_GHG_Protocol_v2016.1.1”

The choice of calculation methodology derived mainly from the internal assessment about availability of data and specific emission factors, so as to present more transparent results, compatible with the reality of the electricity sector, as well as aligned with the Brazilian reality. The national specific and recognized GHG emission factors were adopted, as a principle of applicability, followed by the emission factors of the Intergovernmental Panel on Climate Change - IPCC (1996, 2001, 2006 & 2007). The data referred for calculation of Scopes 1, 2 and 3 were surveyed through a centralized approach, with the parties responsible for their management, and with the following means of determination having been used:

- Records existing in Cemig's ERP[1] system;
- Records in operational systems and of corporate control;
- Invoices;
- Contracts;
- Record spreadsheets.

It is important to emphasize that the areas responsible for information are certified in management standards internationally referenced as NBR ISO 9001:2008 and/or NBR ISO 14001:2004, and SGA Level 1 (applicable to units for which the license has not been issued yet by the environmental agency), all of them audited internally and by a third-part certification body.

Given the complexity for gathering some data for the calculation of emissions, further explanation is needed in these cases, as described below.

For estimating the percentage of losses of SF_6, the factor of 0.71[2]% per year was used, bibliographic data acceptable to the Company's operating sector.

Regarding the calculation of the distance between airports in the category "Business trips - Scope 3", SABRE Red Workspace system, version v.2.10.1 developed by SABRE Inc., was used.

Cemig receives the calculations of energy losses in Transmission, values verified externally and assigned to its responsibility, accounted by CCEE (Chamber of Electric Energy Commercialization). For calculations of energy losses in Distribution, Cemig determines data through the Procedure of Electric Energy Distribution in the National Electric System - PRODIST, Module 7 - Calculation of Distribution Losses.

[1] ERP = Enterprise Resource Planning. It is a kind of corporate management system (e.g. SAP and others) used by large companies.

[2] E.Preisegger, R.Dürschner, W.Klotz, C.- A.König, H.Krähling, C.Neumann, B Zahn. Life Cycle Assessment Electricity Supply Using SF6 Technology. Available at http://www.denix.osd.mil/cmrmd/upload/Life-Cycle-Assessment-SF6-Preisegger-at-al.pdf

4. Period covered

The quantification of emissions resulting from activities performed directly and indirectly by Cemig corresponds to the period between January 1st, 2015 and December 31st, 2015. The historical base-year that was chosen and referenced for the calculations, including for the establishment of the corporate target of reducing Scope 1 emissions, was 2008, because there was energy generation in *Igarapé* TPP, fact that did not occur in past years.

5. Organizational and geographical limits

For reporting purposes, in this inventory, Cemig has adopted the Operational Control approach, *i.e.*, quantified emissions from companies in which Cemig owns 100% of control. All these companies are in Brazilian territory. For the purpose of clarity, all international travel considered for calculating emissions have sections with departure or arrival in Brazil.

The nine companies[3] fully controlled by Cemig, covered in this inventory, are listed in Table 2.

Table 2 - Companies fully controlled by Cemig

1	Cemig Geração e Transmissão S.A. (Cemig GT)
2	Cemig Distribuição S.A. (Cemig D)
3	Rosal Energia S.A.
4	Sá Carvalho S.A.
5	Efficientia S.A.
6	Cemig PCH S.A. [4]
7	Horizontes Energia S.A. [5]
8	Usina Térmica do Barreiro S.A.
9	Cemig Telecomunicações S.A.

[3] From 2015, *Ipatinga* TPP is no longer in the scope of Cemig´s Greenhouse Gas Inventory, due to the end of the contract with Usiminas in December 2014.
[4] Four Small Hydroelectric Plants (SHP) operated by Cemig GT. The emissions are accounted for by Cemig GT.
[5] Small Hydroelectric Plant operated by Cemig GT. The emissions are accounted for by Cemig GT.

6. Operational limits and emission sources

The table 3 lists the greenhouse gas emission sources and their respective categories.

Table 3 - Emission sources and category

SCOPE 1	
Emission sources	**Category**
Fuel consumption of the corporate fleet	Mobile combustion
Consumption by aircraft and small boats	Mobile combustion
Emergency generators	Stationary combustion
Fuel used at TPP Igarapé	Stationary combustion
Fuel used at startup and operation of process gas thermal power plant (TPP Barreiro)	Stationary combustion
Machinery and equipment	Stationary combustion
SF6 emissions from electrical equipment	Fugitive emissions
Fertilizers used in the production of seedlings and plantings	Agricultural activities
Fuels used in forklifts and cranes	Stationary combustion
SCOPE 2	
Emission sources	**Category**
Electrical energy consumption in administrative and operational units	Electrical energy purchase
Technical losses of electric energy in Transmission and Distribution systems	Electrical energy purchase
SCOPE 3	
Emission sources	**Category**
Outsourced transportation of materials, solid waste and equipment	Upstream Transportation and Distribution
Air travel	Business travel
Consumption of gasoline, alcohol and diesel oil by Distribution contractors	Downstream Transportation and Distribution
Electric energy consumption by end consumers	Use of goods and services sold
Outsourced transportation of employees	Transfer of workers

It is noteworthy that, in this inventory, the contribution of the hydroelectric plant reservoirs to climate change has not been evaluated due to the lack of a scientific conclusion about their relationship with emissions of greenhouse gases. Methodologies and conceptual models universally accepted, and with credibility, are not available to quantify the emissions of GHG in reservoirs.

7. GHG emissions

In Table 4, Cemig presents detailing on emissions of Scope 1, Scope 2 and Scope 3, also allowing a historical review of eight years (2008/2015). Comments about the performance of emissions are described in the subsequent items.

Table 4 - History of GHG emissions - Scopes 1, 2 and 3 - 2008 to 2015

Year	Scope 1 (t CO_2e)	Scope 2 (t CO_2e)	Scope 3 (t CO_2e)
2008	287,307	282,439	ND
2009	111,758	390,039	ND
2010	59,642	295,478	4,937,535
2011	24,384	168,189	5,202,775
2012	53,567	436,750	5,341,863
2013	156,618	608,971	7,658,967
2014	617,717	858,014	11,332,770
2015	**164,537**	**809,583**	**9,629,715**

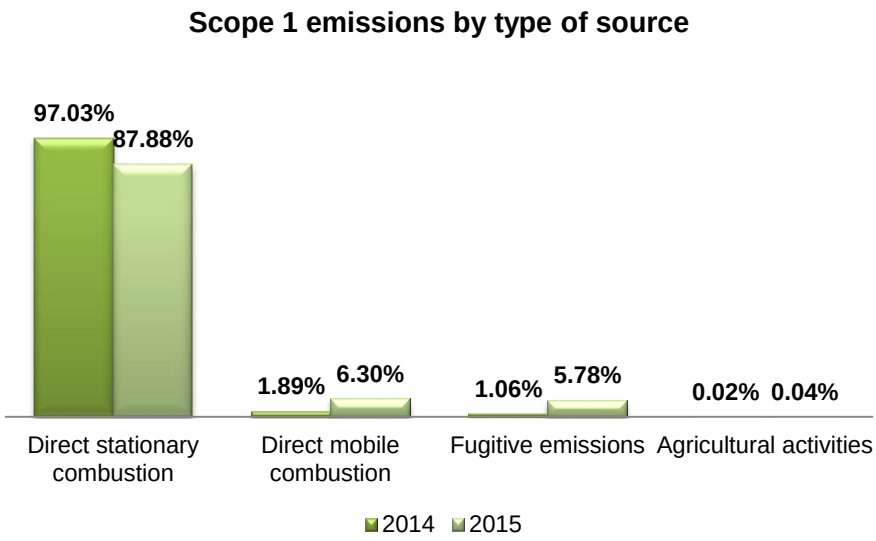
7.1 Scope 1 emissions

Scope 1 emissions, in 2015, were: 10,371 tCO_2e resulting from the fleet of vehicles and aircraft; 9,514 tCO_2e of fugitive emissions from SF_6 gas present in electric equipment; 134,305 tCO_2e from the *Igarapé* Thermal Power Plant; 10,098 tCO_2e from the *Barreiro* Thermal Power Plant start-up; 21 tCO_2e from the use of emergency generators; 172 tCO_2e from the use of machines and forklifts; and 57 tCO_2e resulting from the use of fertilizers.

The intensity of Cemig's direct emissions was 0,008665 tCO_2e/MWh.

Figure 2 presents the emission sources of Scope 1 by type of source and the contribution compared to the total, referring to the years of 2014 and 2015.

Figure 2 - Direct emissions by type of source between 2014 and 2015, Scope 1



7.1.1 Stationary combustion

At Cemig, these stationary emissions originate mainly from its two thermal power plants (99.9%), and machinery, equipment and emergency generators (0.1%). *Igarapé* TPP (131 MW) operates to serve contingencies of the Brazilian Interconnected Power System and, in 2015, was responsible for 92.9% of Scope 1 emissions.

For better comparison of data, one emphasizes that the Scope 1 emissions in 2010, 2011, and 2012 do not account the consumption of *Igarapé* TPP, because in 2010 and 2011 the plant was not dispatched and, in 2012, it was shut down for reformation. In 2013, *Igarapé* TPP consumption returned to be recorded again, because it was under commissioning of equipment, which resulted in fuel consumption, without necessarily generating energy.

It is noteworthy that the energy dispatch decision in Brazil (composition of hydrothermal generation each week) is made by the National Electric System Operator (*ONS*) based on prospective analysis of forecasting of future inflows scenarios, growth expectations of energy consumption and definition of a schedule for the expansion of new plants. In periods of favorable hydrology and high levels of water storage in system reservoirs, the decision of generation in thermal power plants is minimized, giving priority to hydroelectric generation. *ONS*, in case of

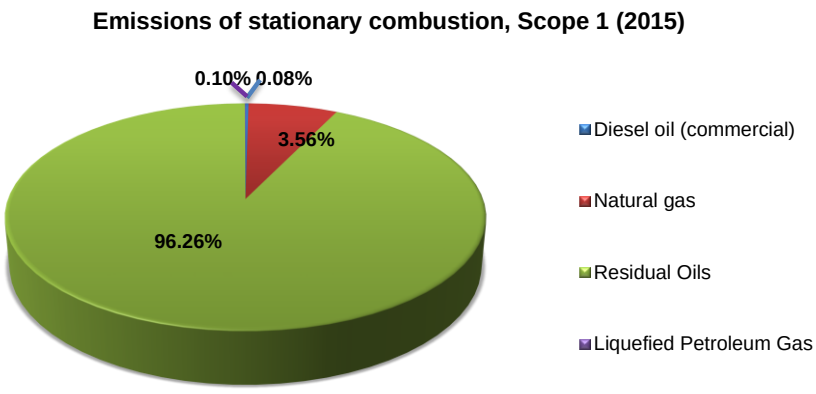
unfavorable hydrology and low storage levels, as occurred in 2014, or even to increase the market supply guarantee with uncertainty in the generation expansion works, tends to increase thermal generation and, consequently, reduce hydroelectric generation, in order to raise the water storage levels of the flow-regulating reservoirs system. In view of this, the generation of *Igarapé* in 2014 assumed the highest value of the last eight years (including the year 2015), which showed a decrease of 76.7% compared to emissions in 2014. In 2015, the plant operated 1,502.33 hours against 6,541.22 hours in 2014.

The other thermal plant, *Barreiro* (12.9 MW), use blast furnace gases, tar and other waste gases generated in steelmaking processes as main fuels. The consumption of fossil fuels, natural gas (NG) in *Barreiro* TPP occurs on machinery start-up or, eventually, on the drop of high source gas supply by steel mill. Natural gas consumption at *Barreiro* TPP decreased from 10,302,820 Nm³ in 2014 to 4.880.800 Nm³, representing less 52.6%, mainly due to the lower plant operating time during the year 2015.

It is also worth mentioning that gases reused from the steelmaking process and which are burned in *Barreiro* TPP are not recorded here, because those gases are generated in the Vallourec's production process and recorded in the inventory of this company. In addition to this fact, these gases are generated by the use of charcoal produced in planted forests, *i.e.*, wood from a sustainable source; therefore, these emissions are considered neutral.

Figure 3 shows GHG emissions by fuel used.

Figure 3 - Emissions of stationary combustion, Scope 1

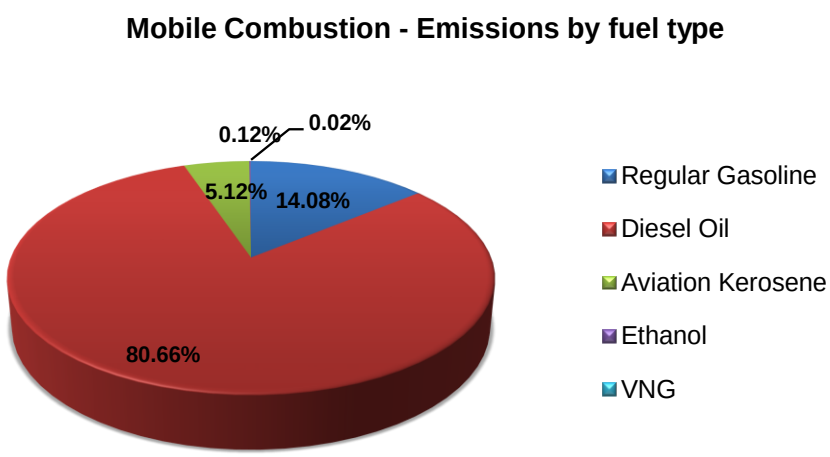


7.1.2 Mobile combustion

Aiming at reducing emissions resulting from mobile combustion processes through logistic optimization measures, management and fleet renewal, and reduction in sections traveled, Cemig obtained a cumulative reduction of 27.5% in emissions during the period of 2010-2015. Compared to 2014, emissions coming from the fleet reduced from 11,688 tCO_2e to 10,371 tCO_2e in 2015, precisely in view of the measures that have been adopted for more efficient fleet management.

These emissions refer to the consumption of gasoline, ethanol, diesel, VNG (Vehicular Natural Gas), and aviation fuel of Cemig's fleet. As illustrated in Figure 4, the largest contribution (80.66%) for mobile emissions comes from diesel vehicles.

Figure 4 - Emissions by fuel used, Scope 1



7.1.3 Fugitive emissions

Cemig's fugitive emissions come from the gas SF_6 used in electric equipment as insulation or to extinguish electric arcs in the Transmission and Distribution of electric power. In 2014, the fugitive emissions referring to SF_6 were 6,530 tCO_2e and in 2015, 9,514 tCO_2e, presenting an increase of 45.7%. This variation is mainly due to incidents with total leakage of the SF_6 contained in the respective equipment.

7.1.4 Agricultural activities

Emissions resulting from Cemig's agricultural activities are characterized by the use of organic or chemical fertilizers in the production of native species seedlings and other ones for urban afforestation, riparian planting and as nutrients used for fish farming. In comparison, between 2014 and 2015, the figures decreased from 101 tCO_2e to 57 tCO_2e, presenting a variation of 43.6%, resulting from the reduction of these activities.

7.2 Scope 2 emissions

Scope 2 emissions refer to the consumption of electric power used in industrial and administrative facilities, coming from the National Interconnected System (SIN), and to the energy losses in Transmission and Distribution (T&D) in the electric system; the latter is the Company's main source of emission. As described in the item Methodology applied, energy losses are calculated using an energy balance verified according to Aneel standard procedures. By way of comparison, it is noteworthy that the Scope 2 emissions are strongly influenced by changes in the electric power emission factor of *SIN*[6], which varies in view of a higher or lower dispatch of thermal plants throughout the year (Table 5).

Table 5 - History of the National Interconnected System Emission Factors

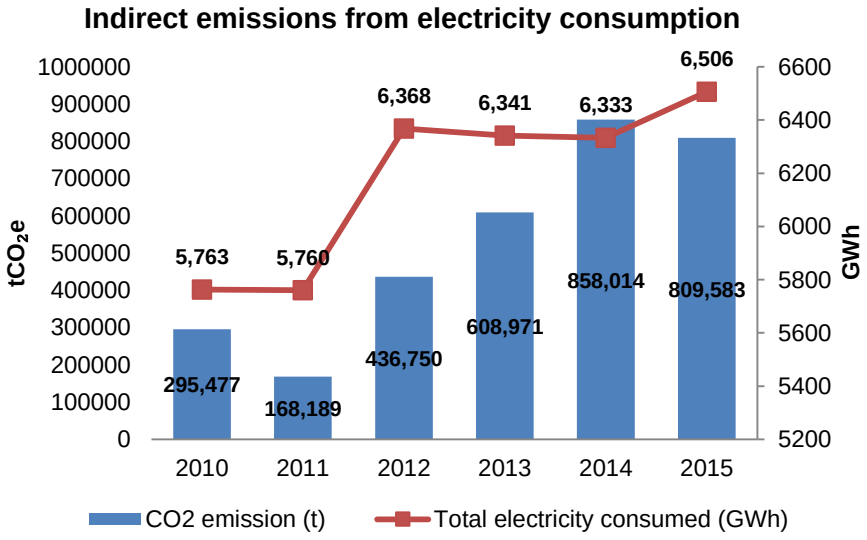
Year	tCO_2e /MWh (Annual Average)
2010	**0.0513**
2011	**0.0292**
2012	**0.0686**
2013	**0.0960**
2014	**0.1355**
2015	**0.1244**

[6] http://www.mct.gov.br/index.php/content/view/321144.html#ancora

Of the total Scope 2 emissions, in 2015, 0.7% (5,565 tCO_2e) resulted from energy consumption and 99.3% (804,018 tCO_2e), from technical losses.

The total Scope 2 emissions, Figure 5, decreased from 858,014 tCO_2e to 809,583 tCO_2e between 2014 and 2015 (5.6%), due to the reduction of *SIN* emission factor.

Figure 5 - Indirect emissions from electricity consumption, Scope 2



The main actions taken to minimize emissions related to energy losses in T&D are described in the item Corporate targets.

7.3 Scope 3 emissions

Cemig seeks continuous improvement of the Scope 3 emissions inventory, introducing new emission sources, always according to the assessment of the level of availability, quality, veracity, and traceability of such data coming from third parties. Table 6 shows Scope 3 emissions by emitting activity.

Table 6 - GEE Emissions in tCO_2e by Scope 3 emitting activity

GHG emissions (tCO_2e)	2011	2012	2013	2014	2015
Transportation of materials, equipment and waste (Transport and distribution Upstream) (Transfer of workers)	1,618	2,874	2,035	1,403	974
Business travelling	1,786	1,953	1,691	1,361	1,138
Energy Sale (Use of goods and services sold)	5,199,371	5,321,724	7,643,677	11,324,277	9,614,752
Operation and maintenance services of Cemig Distribution (fossil fuel consumption by contractors) (Transport and distribution Downstream)	ND	15,313	11,563	5,729*	12,851

* The year of 2014 was atypical with low adherence of contractors in reporting data.

The main source of Scope 3 emissions is the consumption of electric power by end consumers. In 2015, Cemig recorded a decrease of 7.5% in the total sales, which generated a decrease of 15.1% in indirect emissions, highlighted, of course, by a decrease in the *SIN* emission factor, from 0.1355 tCO_2/MWh in 2014 to 0.1244 tCO_2/MWh in 2015. The emission factor was used because the energy Cemig dispatched to the Interconnected System also comprises this calculation made by the Ministry of Science and Technology, although the Company emission factor is lower than that one of the Brazilian Matrix.

Representing 0.012% of indirect emissions, business travelling was responsible for 1,138 tCO_2e. It is verified that the reduction of 16.4% in the respective emissions in comparison to 2014 was consequence mainly of a reduction in the use of this service.

From other emitting sources, 374 tCO_2e came from transportation of materials, equipment and waste; 600 tCO_2e came from transportation of employees; a reduction of approximately 54.3%[7] and a raise of approximately 2.3% compared to 2014, respectively.

Emissions from contractors' vehicles that provide operation and maintenance services for Cemig Distribuição totaled 12,851 tCO_2e from 26 contractors (in a total of 30). It should be noted that the participation and contribution with information by contractors is voluntary. It is noteworthy that the Company continues to develop the

[7] This significant reduction is mainly due to a decrease in fuel transportation for *Igarapé* TPP which operated only 1,502.33 hours in 2015 against 6,541.22 hours in 2014.

engagement Program with its suppliers regarding climate issues.

Carbon Management Program in the Value Chain

In relation to engaging with suppliers, within the 4th edition of the Carbon Management Program in the Value Chain at *CTClima* (Thematic Chamber of Energy and Climate Change) of *CEBDS* (Brazilian Business Council for Sustainable Development), the Brazil's representative at World Business Council for Sustainable Development (WBCSD) since 2012, Cemig has started to incorporate the GHG emission inventory of its suppliers to compose the Company's information base. This program aims to pursue the engagement of suppliers - especially those that most impact on Cemig´s emissions - for the elaboration and disclosure of GHG inventories, through sensitization and training of the selected suppliers.

Since its beginning, the Carbon Management Program in the Value Chain already sensitized and trained 312 suppliers of its member companies in preparing their GHG emissions inventories. Cemig was one of the program's sponsors in 2015 edition, along with three other companies associated with *CEBDS*. In this fourth edition, the percentage of suppliers who participated in the sensitization and training process increased to 46% compared to 35% in 2014. There were 62 qualified suppliers; 14 finished their emission inventories and other 9 are in preparation process.

Engagement methods: the selected suppliers were invited to participate in workshops, with the main objective of raising the participants' awareness about the need to adapt their business management to climate change. Additionally, aiming the technical training to prepare GHG inventories, workshops introduced the calculation tool of the Brazilian GHG Protocol Program and its use, prioritizing the definition of operational limits, identification and classification of the main emission sources and the categorization of emissions between the three Scopes. The workshops were held in May 2015 in two different locations.

Strategy for prioritizing commitments: 50 companies were invited to participate in the Program, having been targeted small and medium-sized suppliers who need support to prepare the GHG inventory.

Measures of success: taking on account all suppliers of all companies participating in the 4th edition of the Program, 46% participated in the workshops held in 2015,

corresponding to 62 companies, representing an 11% increase compared to the 3rd edition in 2014 (noting that Cemig participated only in the 2nd edition onwards). Regarding the assessment of the workshops, 56% of suppliers assessed as very good and 44% considered good. Regarding the realization of inventories, 89% had the intention to prepare their GHG inventories. Of the 55 companies that have confirmed interest in the preparation of the GHG emissions inventory, 25% have completed their inventories.

The percentage of Cemig's suppliers attended the sensitization and training process increased 13% compared to the previous period. Cemig asked 50 suppliers to participate in the Program, 18 suppliers were trained, and five finished their emission inventories.

In the three years of Cemig's participation in the Program, 50 suppliers were sensitized and trained, 17 inventories were drawn up, corresponding to 34% of participation of qualified suppliers.

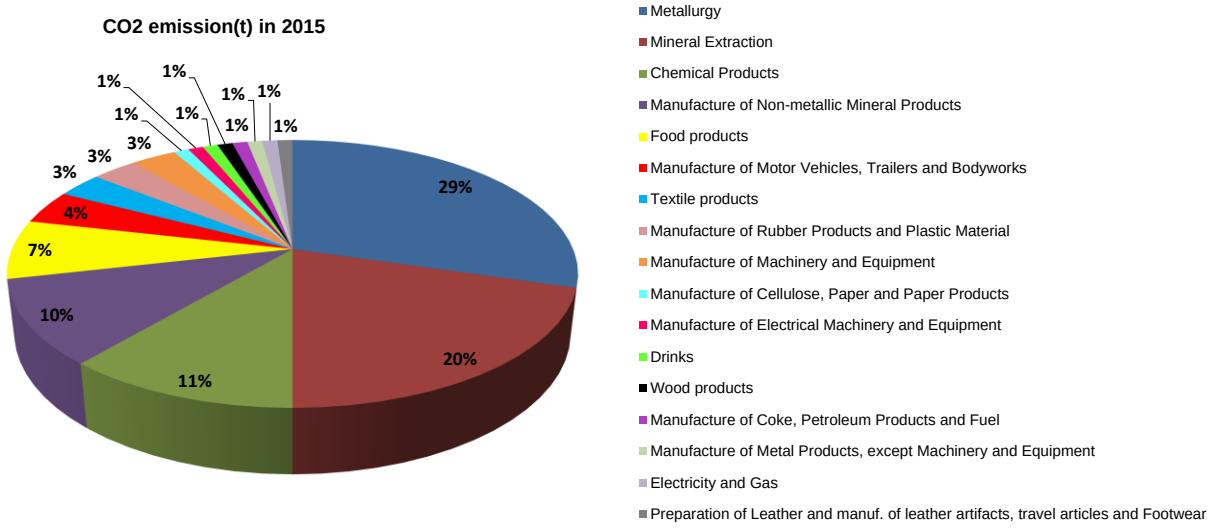
7.3.1 Emissions from energy consumption by third parties

The energy sold by Cemig corresponds to: the sale of energy to captive consumers and free clients in the concession area in *Minas Gerais* State and out of the State; the marketing of energy to other agents of the electricity sector in the *ACR* (Regulated Contracting Environment) and the *ACL* (Free Contracting Environment); and the sales in the *Proinfa* (Program of Incentives for Alternative Electricity Sources) and in the *CCEE* (Chamber of Electric Energy Commercialization), eliminating the existing transactions between companies of the Cemig Group.

Amongst all the sectors with which Cemig commercializes energy, the industrial sector is the largest consumer. Figure 6 presents a qualitative analysis of CO_2 emissions from Cemig's electrical energy consumption. To calculate these emissions, the sector's energy consumption and the emission factor of the National Interconnected System were used.

The CO_2 emission by the Metallurgical Industry accounted for 29% of the total emissions from industrial clients in 2015 (Figure 6).

Figure 6 - Percentage of CO_2 emissions by Industrial Class, in the year of 2015



8. Total emissions

Table 7 shows the total emissions of Cemig, detailed for the nine companies integrating the present inventory.

Table 7 - Emissions broken down by company (tCO_2e)

GHG emissions	Scope 1					Scope 2
($t\ CO_2e$)	CO_2	CH_4	N_2O	SF_6	Total ($t\ CO_2e$)	CO_2
Cemig Geração e Transmissão S.A.	132,286	1,339	2,221	730	136,576	881
Cemig Distribuição S.A.	8,782	12	243	8,784	17,821	808,669
Rosal Energia S.A.[1]	5	0	1	0	6	0
Sá Carvalho S.A.[1]	5	0	0	0	5	0
Efficientia S.A.[2]	5	0	0	0	5	0
Usina Térmica do Barreiro S.A.	10,088	4	6	0	10,098	0
Cemig Telecomunicações S.A.	25	0	1	0	26	33
Total	**151,196**	**1,355**	**2,472**	**9,514**	**164,537**	**809,583**

[1] These plants consume the energy generated by themselves.

[2] Uses the facilities of Cemig Distribuição S.A.

From data presented, it can be seen that Cemig GT and Cemig D represent 93.8% of the total Scope 1 emissions, mainly caused by fossil fuel consumption of *Igarapé* TPP at Cemig GT and by the fleet of vehicles at Cemig D. In relation to the Scope 2 emissions, Cemig D accounts for 99.9% of the total emissions arising from losses in the distribution system.

Table 8 shows a summary of emissions of Scope 1, 2 and 3 by type of gas.

Table 8 - Emission data consolidated for all GHG and Scopes

Emissions in metric tonnes of CO_2 equivalent (tCO_2e)			
GHG (t)	**Scope 1**	**Scope 2**	**Scope 3**
CO_2	151,196	809,583	9,629,318
CH_4	1,355	0	18
N_2O	2,472	0	379
SF_6	9,514	0	0
Total	**164,537**	**809,583**	**9,629,715**

9. Scope 1, quantified separately for each GHG

Table 9 shows the GHG direct emissions broken down by greenhouse gas (t) and in tCO_2e.

Table 9 - GHG emissions in tons of GHG and in metric tons of CO_2 equivalent (tCO_2e)

GHG	In metric tons of each gas (t)	Global Warming Potential[1]	In metric tons of CO_2 equivalent (tCO_2e)
CO_2	151,196	1	151,196
CH_4	54.2	25	1,355
N_2O	8.3	298	2,472
HFCs	-	12,000 – 14,800	-
PFCs	-	7,390 – 12,200	-
SF_6	0.4	22,800	9,514
Total	151,259	-	164,537

[1] Source: IPCC (2007)

CO_2 is the gas of greater representation in the calculation of total emissions due to the significant use of fossil fuels by Cemig's Thermal Power Plants, calculated in the Scope 1.

10. Corporate targets

Aware of its commitment to the mitigation of its gases emissions which contribute to global climate change, Cemig has defined a corporate target of reducing direct emissions intensity (Table 10).

Table 10 - Corporate Target to Reduce the Intensity of Direct Emissions

Scope	% reduction relative to the base year	Metric	Base year	Emissions normalized for the base year (tCO_2e / MWh)	Target year
1	8%	tCO_2e / MWh	2008	0.007801	2015

Direct emissions intensity of Cemig in 2015 was 0.008665 tCO_2e/MWh, exceeding the value of the target set by the Company (11%). This is due to the fact that in 2008 were generated 33,412,535 MWh versus 18,989,539 MWh in 2015 (the amount of energy generated is the denominator of this target calculation).

Since 2016 a new target was set by Cemig, as shown below:

Table 11 - Corporate Target to Reduce Direct Emissions (tCO_2e)

Scope	% reduction relative to the base year	Metric	Base year	Emissions for the base year (tCO_2e)	Target year
1	8%	tCO_2e	2014	617,717	2021

With the same purpose, Cemig has set a target for reducing electric energy consumption (Table 12).

Table 12 - Corporate Target to Reduce Electric Energy Consumption

Scope	% emission of the Scope	% reduction relative to the base year	Metric	Base year	Organizational boundaries	Target year
2	0.8%	4%	GJ	2011	Cemig GT and Cemig D	2020

From 2011 to 2015 there was a reduction of 5.2% in electricity consumption.

Another target set is related to management of technical losses of electric energy in the Transmission and Distribution (Table 13).

Table 13 - Corporate Target to Reduce Technical Losses of Electric Energy

Scope	% emission of the Scope	Target percentage	Metric	Base year	Organizational boundaries	Target year
2	99.2%	To remain below the rate of 10.68% of energy losses	% losses calculated	2013	Cemig GT and Cemig D	2017

The total losses were 11.69% in 2015. In relation to the values for losses indicators, the *IPTD* (Distribution Technical Losses Index) was 11.69% for a regulatory target of 10.76% (for the year 2015). It is important to note that to define this regulatory target during the 3rd Tariff Revision Cycle in 2008, *Aneel* did significant changes in the methodology of technical losses calculation, imposing challenging targets for Cemig. The improvement of results depends on factors - some of them are under Cemig´s control and others are not - and Cemig has concentrated efforts to improve what it can manage and achieve the target. Among these controllable factors are: study and propose the reconfiguration of lines of high voltage system, aiming the technical losses reduction; take part in the integrated planning of the electrical system, evaluating the technical losses reduction brought by the structural works; run the reactive compensation plan in medium voltage, with the installation of 225 automatic capacitor banks; make inspections in consumer units for checking the regularity of measuring equipment; and replace obsolete meters or nonstandard ones. Among the non-controllable factors, are the north-south flow, reservoir levels and the seasonality of load.

11. GHG emissions from biomass

The considered “neutral carbon” emitted in the burning of biomass is reported separately, in accordance with the guidelines of GHG Protocol. For fossil fuels with the addition of biofuels, the values given by the National Petroleum Agency (*ANP*) were adopted, compiled in the Calculation Tool of the GHG Brazilian Protocol Program. In 2015, the average addition of ethanol (anhydrous) to the gasoline sold in Brazil was 27% and 7% of biodiesel in diesel.

Table 14 shows the emissions from biomass consumption.

Table 14 - CO_2 emissions from biomass consumption (tCO_2e)

Scope 1	*1,411*
Scope 3	*1,294*
Total	**2,705**

12. GHG reductions and removals

Cemig performs some actions which indirectly contribute to GHG removal; however, given its peculiar characteristics related to quantification of emissions and due to its low level of assertiveness and integrity, at the moment, the Company has chosen not to quantify them.

Some of the initiatives which contribute to GHG removal are:

- The Riparian Reforestation Program, which is an action of cooperation between the Company, the landowners of the surrounding areas of reservoirs considered as Permanent Preservation Areas (*APP*) and the Public Prosecutor's Office. Owners are encouraged by Cemig to preserve these areas and promote riparian reforestation. To do so, the Company provides seedlings and bears the implementation costs; in turn, the owners provide areas and undertake to properly maintain them. In 2015, Cemig has recovered approximately 69 ha of riparian forests around its reservoirs, in partnership with landowners of the Permanent Preservation Areas.
- The Company manages two forest nurseries, located at the Environmental Stations of *Itutinga* and *Volta Grande*, where seedlings have been also produced for the urban tree planting, in addition to a seed laboratory, located in *Belo Horizonte*. 3,330 seedlings were distributed in 2015 for urban tree planting, donated by the Forest Nursery of *Itutinga*. In addition to producing seedlings for urban tree planting to comply with agreements with Municipal Governments, Cemig's forest nurseries also produce native species

seedlings for reforestation of riparian areas around its reservoirs, tributary rivers and springs, in partnership with farmers.

The strategy for GHG emission reduction is based on ten principles ("Commitment to Climate Change"), in which three main initiatives are highlighted: 1. Energy generation from renewable sources; 2. Fleet management; and 3. Expansion of the renewable energy matrix and maintenance of assets. Some of the corporate initiatives which contribute to GHG reduction are:

Scope 1

- Defined as a corporate strategic driver, promoting the use of renewable sources of energy is also focused on fostering greater diversification of the power generator complex, with new sources, such as wind, solar, and other possibilities pointed out by researches and innovation of the Company.
- Recent R&D projects show results which can be used on a large scale by the Company in the medium and long term such as: i) generating electricity in solar power plants connected to the electrical system, know-how which has been pioneering developed by Cemig through the Sete Lagoas Solar Power Plant and Mineirão Solar projects, the latest already opened; and ii) the implementation of a smart grid in an experimental way in Sete Lagoas City.
- Considering the vehicle fleet of Cemig D and Cemig GT, the fleet fuel consumption has been reduced by 3.71%, representing savings of approximately R$ 1.8 million to the Company, between 2014 and 2015. Since 2011, Cemig reduced its annual consumption by 18.31%, i.e. there was a decrease in consumption of more than one million liters over the past five years. This reduction in consumption is due to the renewal of the vehicle fleet, in the scope of the "Fleet Replacement Program", implemented in 2010; and the constant optimization of the Company's fleet. The fleet optimization in this period was possible because all vehicles replaced in 2010 came with Electronic Management System installed. This tool is allowing constant monitoring of the vehicles use - from 2011 to 2015, there was a reduction of 628 units. In relation to air transport, aviation kerosene consumption was reduced by 6.4%, representing savings of approximately R$ 60,900 to the

Company.

- Investments in training, equipment, change of methodology, and processes with a focus on mitigation of SF_6 losses, either by elimination of leaks, or by eliminating losses in the maintenance process.
- Additionally, it should be noted that Cemig evaluates the risk of carbon emissions increase in its energy matrix, by conducting environmental due diligence, concerning the acquisition and/or merger of new assets, or considering the risk in the calculation of technical and economic feasibility for new projects by conducting sensitivity analysis. This initiative has helped the Company in decision-making, considering the climate strategy in expanding its businesses.

Scope 2

- Establishment of corporate targets for reduction of electric power consumption in Cemig, as described in the item Corporate targets.
- Investment in works to strengthen the electric system of medium and low voltage, a total of R$ 65.8 million, and investment of R$ 219.4 million to expand and strengthen the sub-transmission system (69 kV to 230 kV);
- Project of reactive compensation in medium voltage: preparation of a reactive compensation plan for installing 225 automatic capacitor banks by 2016, with a planned investment of R$ 9.0 million and reducing associated technical losses of R$ 2.0 million/year (corresponding to 9.4 GWh/year).
- Acquisition and installation of distribution transformers with amorphous core technology, which reduces no-load losses by about 80%, in addition to strengthening the respective low-voltage circuits.

Scope 3

- Energy Efficiency Projects referred to in Smart Energy Program of Cemig are relevant instruments for indirect emission reduction from third parties in providing reduction in electric power consumption of the end consumers, by

replacing obsolete electrical equipment of high consumption level, and promoting environmental education initiatives. In 2015, these projects prevented the emission of 627 tCO_2e.

- The projects encouraged and implemented by Efficientia will prevent the emission of 239.43 tCO_2e/year in industrial and commercial customers. Efficientia is an Energy Services Company (ESCO) operating in the development and feasibility of technological solutions for promoting the efficient use of energy and the consequent reduction of greenhouse gas emissions at facilities of clients of medium and large size commercial, industrial, and services sectors.

13. Exclusions

The inventory has intended to account for all major emission sources from Scope 1 and Scope 2. Disposal of solid waste and wastewater generated in the operation were not accounted for in Scope 3 (organic matter), which are treated and disposed of by a third party.

14. Recalculation

There was no need for recalculation of previous years reported in recent inventories because Cemig did not show significant changes in its structure, capacity and emission sources in 2015.

15. Uncertainties and quality of the report

Cemig has sought grounds from the best methodologies, references and tools for calculating GHG emissions, publicly available, to ensure optimal quality of reports and to reduce the maximum possible level of inventory uncertainties. Regarding the data verified, upon opting for the centralized approach, Cemig understands that it has reduced the calculations duplicity risk, estimates and possible errors in formulas and calculations.

Another fundamental item to assure the quality of its inventory is the fact that the

information sources used are contemplated by the Company´s Management System, based on ISO 9001, ISO 14001 and OHSAS 18001 standards, which guarantee processes and procedures oriented to quality, reliability and tracking of the information verified. The standards to guarantee conducting the critical analysis, handling and management of information, beyond the regulatory requirements to ensure greater reliability in the results, are described in the Management Systems Manual and in the General Procedures drawn up and approved at the corporate level. Finally, all of data used, its sources and collection methodology and procedures, in order to guarantee the information integrity, were verified by an independent third party.

The uncertainty level on an inventory is owing to errors introduced in the calculations of those emissions, whether quantifying the activity of a source, or the emission factor used. The activity of a source is the data expressing the intensity of such source. For example, the fossil fuel consumption of *Igarapé* TPP is a data of the activity of that source, and relative inaccuracies of that data increase the uncertainty percentage on the emission calculation of that source. That imprecision normally is owing to the sum of the inaccuracies of equipment which measure the source activity. In the case of fuel consumption, this uncertainty is owing to the uncertainty of the equipment which measures the amount of liters indeed consumed and the burning efficiency of that fuel. Failures in data collection are associated with the inventory quality, much more than the calculation uncertainty.

Similarly, the inaccuracy existing in the emission factor of the fuel burning also increases the final calculation uncertainty. The final uncertainty is predominantly determined by the activity uncertainty and by the uncertainty of the emission factor.

To estimate Cemig's GHG inventory uncertainty, the “GHG Protocol Short Guidance for Calculating Measurement and Estimation Uncertainty for GHG Emissions" was used, having as the level of uncertainty +/- 4.7%.

It is understood that this uncertainty calculation follows the recommendations of the "Guidance" mentioned; however, it is worth noting that it contains errors and inaccuracies concerning the way it was executed, that is, it considers general factors and not the real existing inaccuracies, which would be laborious and costly for obtaining a more accurate value. The data serves, however, to generally indicate that inventory follows the best practices recommended by the “GHG Protocol”,

resulting in adherent information and with the quality expected by the methodology adopted.

16. Responsible for preparing this report

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17. Annex 1 - Verification statement

STATEMENT

Bureau Veritas Certification, established on Avenida do Café 277, 5th floor, tower B, Vila Guarani, São Paulo, SP, entered with the CNPJ (National Register of Legal Entities) under number 72.368.021/0001-84, states for appropriate action that CEMIG - Companhia Energética de Minas Gerais, established on Avenida Barbacena, 1200 – 17th floor, wing A1, Belo Horizonte, Minas Gerais, entered in the CNPJ (National Register of Legal Entities) under number 17.155.730/0001-64 in the city of Belo Horizonte, Minas Gerais is authorized to publish in all their titles and websites the words of the Statement of Conformity according to the wording below: **"Bureau Veritas Certification, based on the processes and procedures described in its Verification Report, adopting a reasonable level of confidence, states that the Inventory of Greenhouse Gases - year inventoried 2015 of CEMIG - Companhia Energética de Minas Gerais, is precise, reliable, free of errors or distortions and has an equitable representation of GHG data and information related to the reference period for the defined scope; it was prepared in accordance with the specifications of NBR ISO 14064-1 and with Brazilian Program GHG Protocol and verified according to specifications of 'NBR ISO 14064:2007 part 3 – Specification with guidance for validation and verification of greenhouse gas assertions; and specifications of Brazilian Program GHG Protocol.' and specifications of Brazilian Program GHG Protocol."**

Verified emissions:

Scopes 1, 2, and 3 (in tCO_2e)

Approach	Scope 1	Scope 2	Scope 3	Total
Operational Control	164,537	809,583	9,629,715	10,603,835

São Paulo, May, 10th, 2016

Lúcia Nunes
BVQI do Brasil Sociedade Certificadora Ltda.