

B3 S.A. – Brasil, Bolsa, Balcão

2017 Greenhouse Gas Emissions Inventory
Results

Corporate GHG Inventory – 2017

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Executive summary

The greenhouse gas (GHG) emissions inventory aims to increase the transparency and control by the company over its GHG impacts, by recording and disclosing the GHG emissions caused by its business activities. The inventory should be used as a basis of a company's Carbon Management practice, which will support initiatives related to opportunities for reducing emissions and enhancing processes.

In march 2017 B3 S.A. – Brasil, Bolsa, Balcão (hereinafter referred to as B3) was established from the merger of BM&FBOVESPA and Cetip. Following the commitment of BM&FBOVESPA S.A., that quantifies its emissions since 2009, B3 prepared its first annual inventory with third party verification. In 2018, KPMG assisted B3 in the compilation of its inventory based on data for 2017. The results of this engagement are set out in this report and will serve as a basis to support management of the issue by the stock exchange and direct its initiatives.

B3's absolute emissions in 2017 amounted to 299.94 tCO₂e for scope 1, 2,997.12tCO₂e for scope 2 and 1,492.81 tCO₂e for scope 3. For scope 1, we draw attention to fugitive emissions released by replacing refrigerant gases which were the main factor responsible for the 65% decrease over 2017. For scope 2 emissions there was a substantial increase of 36%, due to the merger and the 14% increase in the Brazilian GRID emissions factor in 2017. The indirect scope 3 emissions, which fell by 13% over the previous year - were primarily due to the non-inclusion of services providers on the emission quantification of commuting, (employees traveling to and from work).

Since 2013 (bench line years of 2011 and 2012), B3 has been offsetting the greenhouse gas emissions it cannot reduce, thereby making it carbon neutral. This process has been annual ever since. The objectives of these initiatives include identifying, managing and reducing its environmental impact, and contributing to the global effort against climate change and the effects thereof.

Definitions and Concepts

- This inventory includes the following greenhouse gases embraced by the Kyoto protocol: CO₂, CH₄, N₂O, SF₆, NF₃ and HFCs and PFCs.
- The Global Warming Potential – GWP compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide, whose potential is standardized to 1, over a given time period and is used to calculate the carbon dioxide equivalent (CO₂e) of greenhouse gases, transforming them into a standard unit. In accordance with the protocol decisions, the GWP amounts were adopted in the Fourth IPCC Assessment Report – AR4. The amounts can be seen in the table below and the full list on the IPCC site:

Gas	New GWP value (2013 to 2017 inventory)
CO ₂	1
CH ₄	25
N ₂ O	298
SF ₆	22,800
Hf Cs	124 – 14,800
PFCs	7,390 – 12,200
NF ₃	17,200

Methodologies used

- The methodologies, scope, calculations and assumptions used to create this inventory can be seen in the report of procedures for compiling greenhouse gas inventories - 2017 and the calculation spreadsheet and collection forms, accompanying this report.
- The main references used for this inventory are:
 - The Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard - Revised Edition - March 2004 - WRI/WBCSD.
 - 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Intergovernmental Panel on Climate Change).
 - Programa Brasileiro do GHG Protocol - Guia para elaboração de inventários corporativos de emissões de gases de efeito estufa (GEE) – FGV, 2009.

Inventory limits

- In order to determine the organizational limits of its inventory, the company should adopt one of the approaches presented by the GHG Protocol: equity interest and control (operational or financial).
- B3 opted for the operational control approach, whereby the company is responsible for the emissions from sources and activities it exercises control over. Therefore, if B3 exercises control over a given source of emissions, where it can implement operational measures, this source is considered to be an integral part of the company's organizational limit.
- This inventory embraced all companies over which the stock exchange exerts operational control. The following groups were therefore included:
 - B3 S.A
 - Banco B3.
 - Bolsa de Valores do Rio de Janeiro (BVRJ)
 - Supervisão de Mercados (BSM)
 - B3 Social
 - International Offices:: New York, London and e Shanghai

Inventory limits

The scope concept introduced by the GHG Protocol will help companies set operational limits to be recorded. The three scopes are defined as follows:

Scopes of GHG Emissions

Scope 1

Direct GHG emissions – GHG emissions under the company control and responsibility

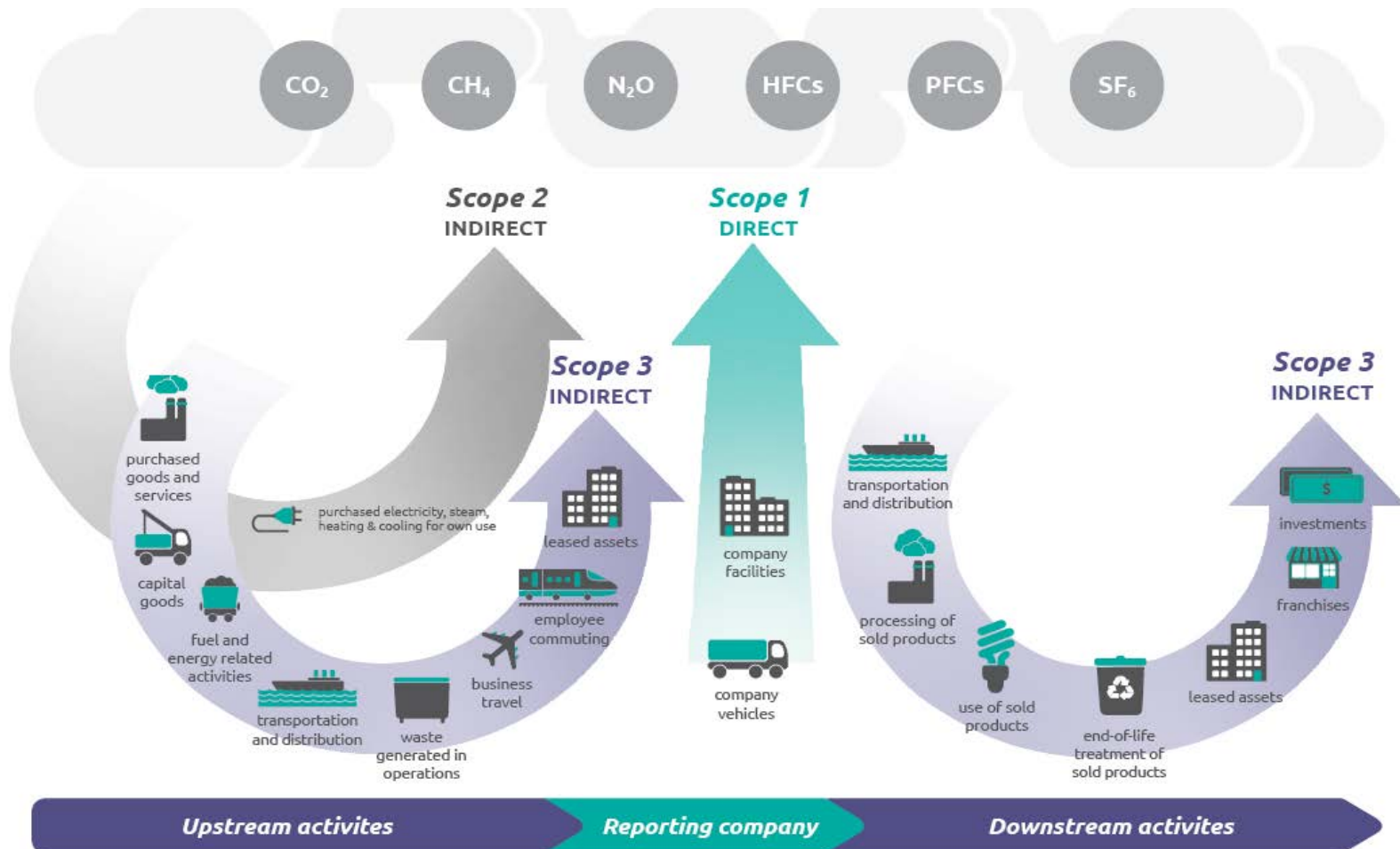
Scope 2

Indirect GHG emissions – Emissions stemming from purchased electricity or steam generated.

Scope 3

Other indirect GHG emissions – Other indirect emissions comprise those in the company's value chain which are not controlled by B3.

Inventory limits



Fonte: Corporate Value Chain (Scope 3) Accounting and Reporting Standard - Greenhouse Gas GHG Protocol

Inventory limits

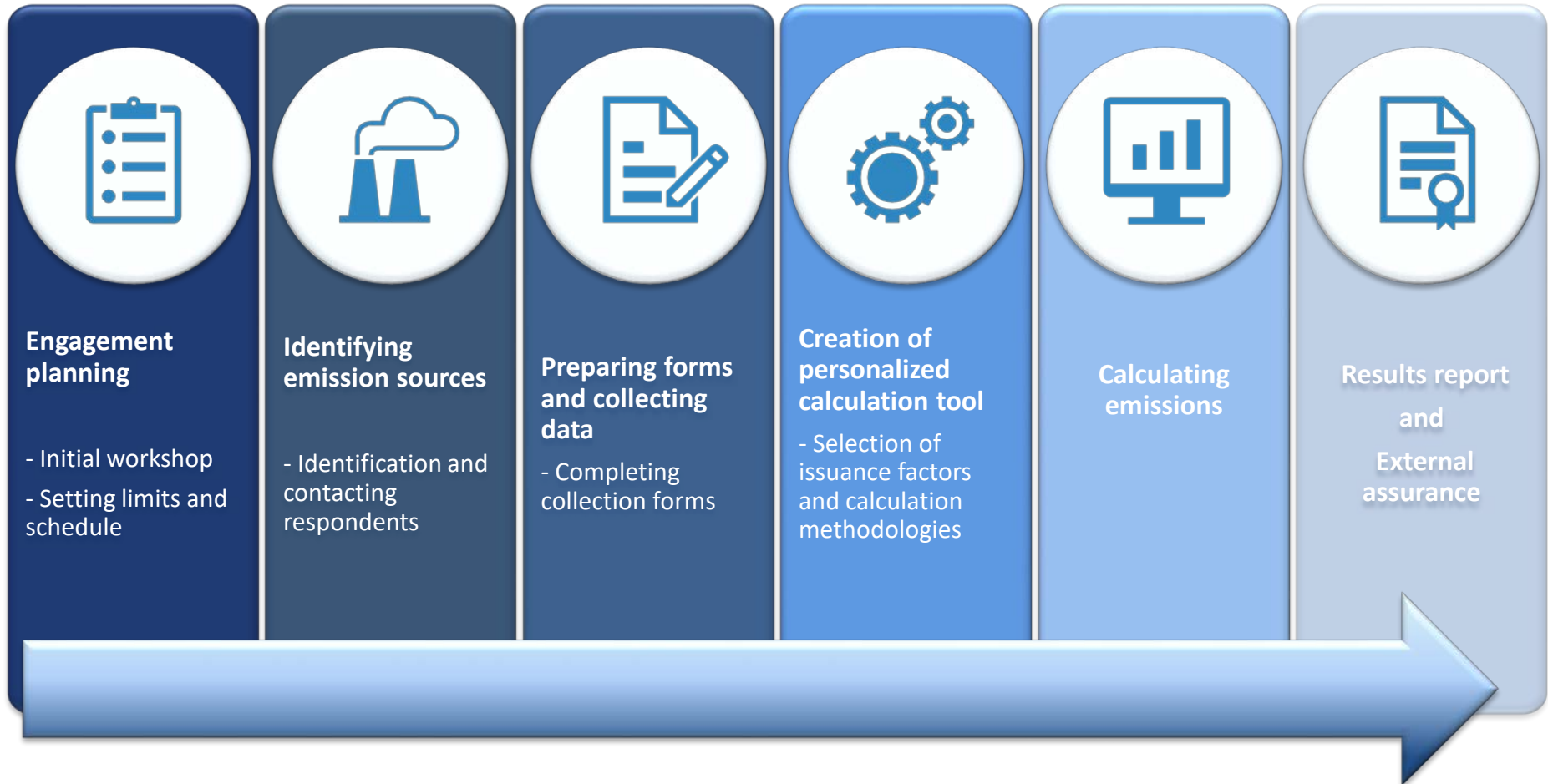
Based on the guidelines of the Brazilian GHG protocol program and activities of B3 this inventory identified and included the following emission sources:

B3 Emissions Source		
Scope 1	Stationary combustion sources	Use of fossil fuels to generate energy and cook food.
	Mobile combustion sources	Combustion of fossil fuels used in the operation of vehicles.
	Fugitive emissions	Unintentional release from sources including refrigerant systems and use of extinguishers.
Scope 2	Purchased energy	Emissions from the generation of purchased electricity, and use of fossil fuels to generate electricity.
Scope 3	Category 1 – Purchased goods and services	Combustion of fuel vehicles operated by third parties to transport documents (motorbike couriers)
	Category 5 - Waste generated in operations	Treatment of solid waste managed by third parties.
	Category 6 - Business travel	Air travel involving employees and taxi transportation
	Category 7 - Employee commuting	Commuting
	Other emissions under Scope 3 (Fugitive)	Unintentional release from refrigerant systems controlled by third parties.

Core Changes in 2017

- In 2017 the BM&FBOVESPA Sports and Cultural Center (EECB) had been deactivated, meaning its emissions were no longer counted.
- The Tabapuã office was deactivated in 2017 and its emissions were recorded up until its closure.
- In March 2017 BM&FBOVESPA and CETIP merged into B3. The inventory was therefore compiled by using the data of CETIP and BM&FBOVESPA prior to the merger, in order to ensure the annual emissions were completed, as recommended by Brazil's GHG Protocol Program.
- The employee commuting survey for 2017 only focused on employees and trainees of B3 and students of AP, resulting in this figure diminishing.

Stages of Compiling the GHG Emissions Inventory





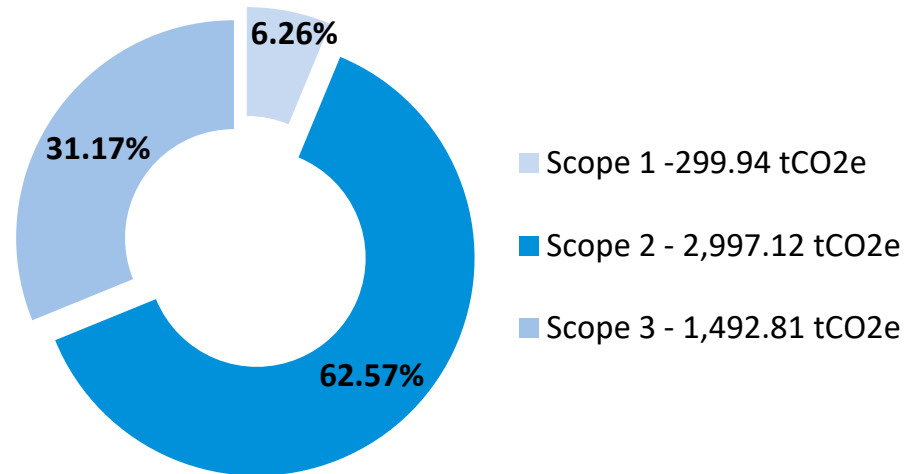
Results

Results - Absolute Emissions

This chapter presents B3's GHG inventory results for 2017, compiled based on information collected internally and the methodologies and assumptions used.

B3's total GHG emissions for 2017 amounted to 4,789.87 tCO₂e. As shown opposite, 6% of B3's emissions consisted of direct sources and sources controlled by the company (scope 1). Other emissions consisted of indirect emissions, with 63% belonging to scope 2 and 31% to scope 3.

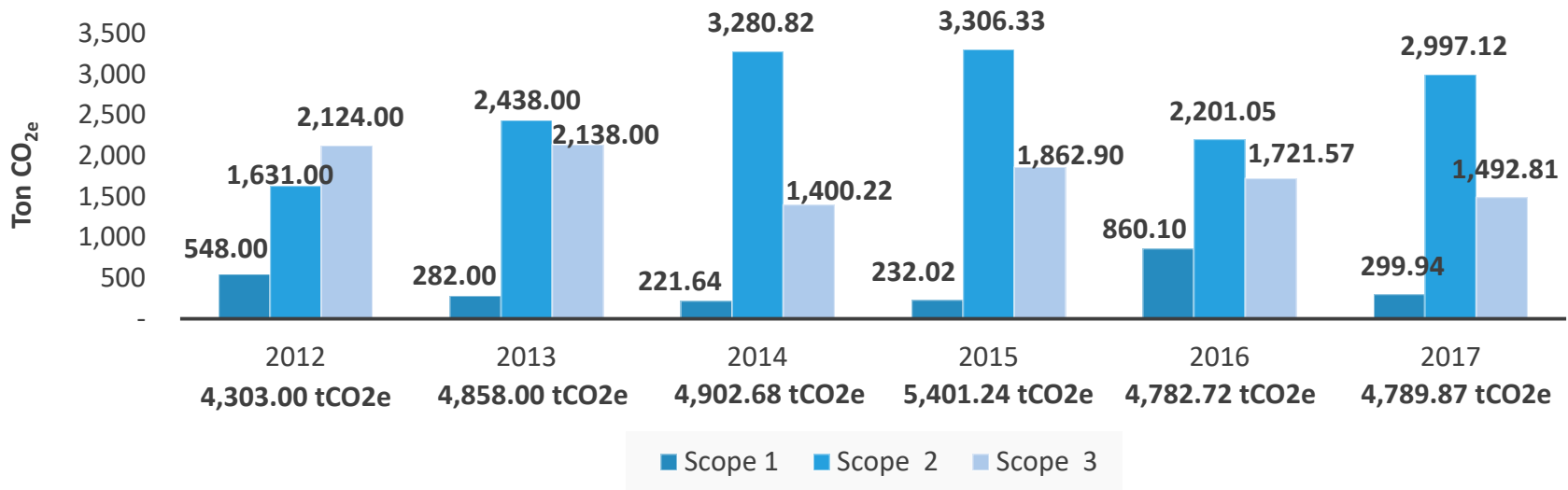
B3 Emissions by Scope



Results - Absolute Emissions

B3

Emissions by Scope 2012 to 2017



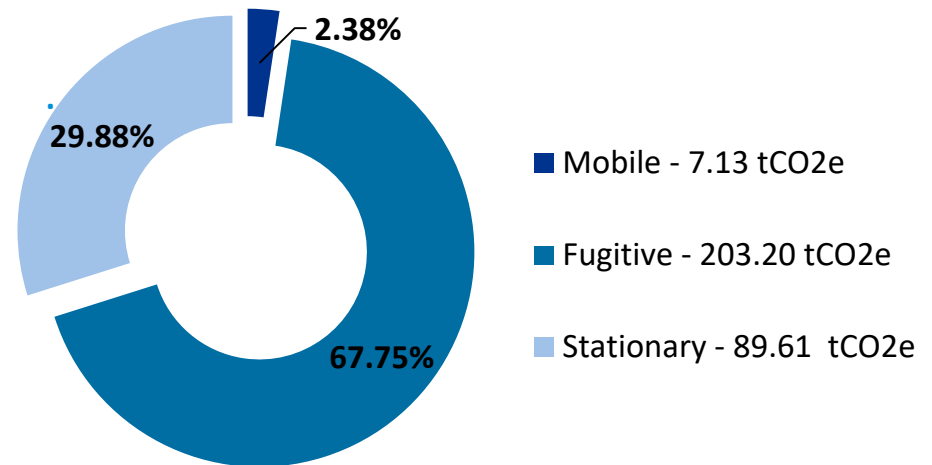
As is usual for financial and services companies, B3's direct emissions are much lower than its indirect emissions.

B3's total emissions in 2017 rose by approximately 0.15% compared with BM&FBOVESPA's 2016 emissions.

Results - Absolute Emissions Scope 1

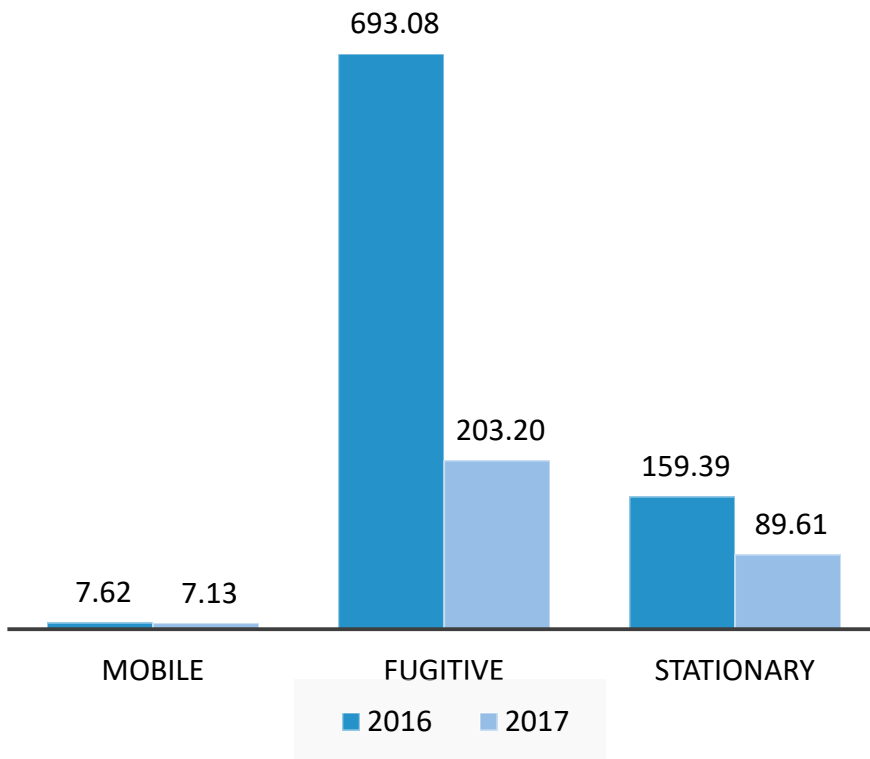
The largest scope 1 emission sources were found in fugitive sources, due to the replacement of air-conditioning gases (refrigerants). Although the mass of gas was low (approximately 0.115 tonnes), its heating potential is very high, making it an important source of emissions of the company when converted to CO₂e.

B3 GHG Emissions Scope 1



Source of Emission	tCO ₂	tCH ₄	tN ₂ O	tHFCs	tCO ₂ e
Mobile	6.840	0.003	0.001	0.000	7.129
Fugitive	1.222	-	-	0.115	203.204
Stationary	89.091	0.012	0.001	0.00	89.609

Results - Absolute Emissions Scope 1



B3's 2017 emissions dropped noticeably by 65% on BM&FBOVESPA's total scope 1 emissions for 2016.

Emissions from all scope 1 sources diminished, with the main decrease occurring in fugitive emissions which account for approximately 68% of scope 1 emissions. This decrease of approximately 71% is related to the decrease in the replacement of refrigerants in 2017.

Replacement of gas in air conditioning appliances varies and depends on how much the equipment is used. It is normal for years of heavy use to be followed by years of lower use, as the replacement does not always take place every year.

In 2017, emissions from B3's stationary and mobile sources accounted for 2% and 30% of the total scope 1 emissions. The stationary source decreased by 44% in absolute emissions, which is due to the lower consumption of diesel at the data center. Mobile source emissions contracted by 6.5% compared with BM&FBOVESPA's data for 2016.

Results - Absolute Emissions

Scope 1

Mobile sources

Scope 1 mobile emissions stem from the use of vehicles by the company. B3 has a very small fleet, which explains the low emissions compared with other sources comprising this scope. In 2017, B3's fleet ran on ethanol, gasoline and diesel, with gasoline accounting for 73% of the emissions from this source.

In 2017 the percentage of ethanol in gasoline held steady at 27%, although diesel had its composition changed from 7% to 7.8% biodiesel in the annual average. This change helped reduce nonbiogenic emissions, thereby mitigating the impact on diesel consumption.

As can be seen in the table below, the decrease in mobile source emissions is primarily due to lower fuel consumption:

Source of Emission	Activity	Fuel	2016		2017	
			Consumption in liters	tCO2e	Consumption in liters	tCO2e
Mobile	Company fleet	Ethanol	2,924.76	0.04	2,212.04	0.03
Mobile	Company fleet	Diesel	951.51	2.34	772.925	1.89
Mobile	Company fleet	Gasoline	3,103.61	5.24	3,087.50	5.21

Results - Absolute Emissions

Scope 1

Stationary sources

Stationary source emissions result from the combustion of fuel (diesel oil) by generators and the use of natural gas and LPG in restaurants and heaters. The most significant emissions from this source in 2017 came from generators, accounting for approximately 88% of emissions. We emphasize that this scope only took into account generators owned by the B3. All energy from third-party sources was allocated to scope 2, in accordance with the guidelines of the Brazilian GHG Protocol.

The consumption of diesel by the data center's generators accounted for 45% of stationary source emissions, falling by 65% between 2016 and 2017. This decrease in the data center's emissions was a direct consequence of its lower diesel consumption.

Source of Emission	Activity	Fuel	tCO2e
Stationary	Canteen	Natural Gas	8.58
Stationary	Canteen	LPG	0.38
Stationary	Generator	Diesel Oil	78.70
Stationary	Heater	LPG	1.95

Results – Absolute Emissions

Scope 1

Fugitive Sources

In 2017, fugitive emissions primarily stemmed from the replacement of CO₂ in the units' fire extinguishers (1.222 tonnes) and the replacement of R407C gases (0.10305 tonnes), R-134a (0.0086 tonnes) and R410A (0.0033 tonnes). R-22 and R141-B air-conditioning gas was replaced, although as this gas is not included in the Kyoto protocol its emissions were not included in the inventory.

Compared with previous years, the replacement of extinguishers continues to be of negligible importance and refrigerant gases accounted for 99.4% of the emissions from this source and 67% of the absolute emissions in scope 1.

Scope	Source of Emission	Activity	2016		2017	
			Gases (t)	tCO ₂ e	Gases (t)	tCO ₂ e
1	Fugitive	Extinguishers – CO ₂	1.60	1.60	1.22	1.22
1	Fugitive	Air conditioning – R134A	0.00	0.00	0.01	12.30
1	Fugitive	Air conditioning – R407C	0.32	570.20	0.10	182.80
1	Fugitive	Air conditioning – R410A	0.06	121.28	0.003	6.89

Results - Absolute Emissions

Scope 2

Scope 2 emissions consist of emissions from energy (electricity and steam) purchased externally. In 2017, B3 consumed 31.35 GWh from the Brazilian electricity grid its operations, an increase of 20% compared with BM&FBOVESPA's consumption in 2016.

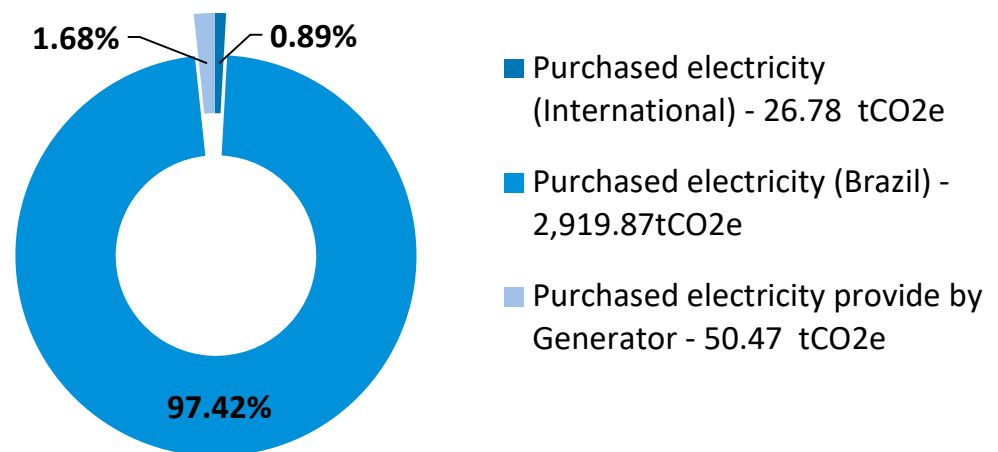
In 2017, the emissions associated with this scope accounted for 63% of the company's total emissions, which can be split into three categories: use of third-party generators, energy consumed in international offices and energy consumed in Brazilian offices.

International emissions in London, Shanghai and New York were calculated by estimating the annual energy consumption per employee of the units in Brazil. This figure was used to quantify these units' emissions, which accounted for 0.9% of scope 2.

The emissions released by generators operated by third accounted for 1.68% of scope 2 emissions.

B3

GHG Emissions – Scope 2



Results - Absolute Emissions

Scope 2

Source of Emission	tCO2	tCH4	tN2O	tCO2e
International Energy Purchases	26.78	-	-	26.78
Brazil Energy Purchases	2,919.87	-	-	2,919.87
Generator Energy Purchases	50.16	0.01	0.0004	50.47

The distribution of emissions are coherent with the company's structure. As most of the offices are located in Brazil, 97% of the scope 2 emissions consist of energy purchased in this country.

The emissions from purchased energy are based on specific emission factors determined according to each country's energy matrix. Although Brazil is the most important because of the number of units, its emissions factor (tCO2e/Mwh) is lower compared with overseas units.

Results - Absolute Emissions

Scope 2

Energy consumption in Brazil rose by 20% in 2017. Coupled with the 13.5% increase in GRID emissions, this increase was responsible for the 37% increase in related scope 2 emissions and energy acquired from the Brazilian GRID.

The GRID emissions factor is related to the use of thermal power plants during the year (when hydroelectric power plants cannot meet the population's energy requirement, more thermal power plants are activated to meet this demand) which consequently leads to a variance in greenhouse gas emissions.

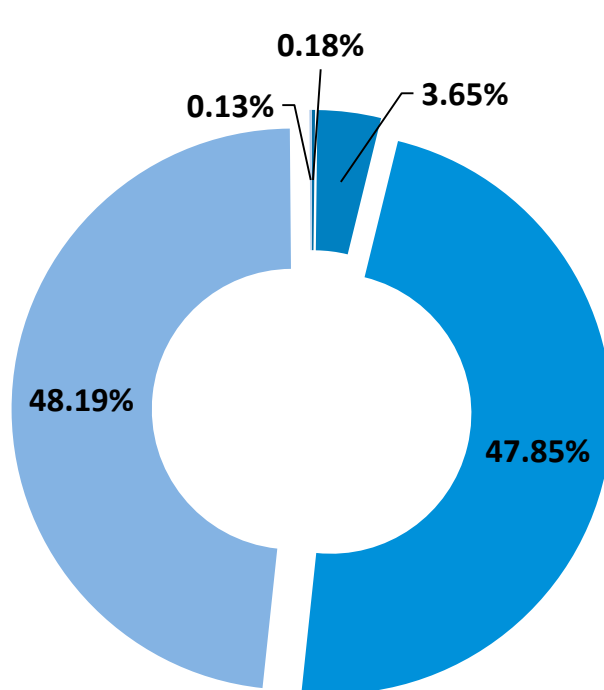
The table below presents the stock exchange's electricity consumption variances between 2016 (BM&FBOVESPA) and 2017 (B3) and the variance in the GRID emissions factor, thereby justifying the increase in this scope's emissions.

Despite excluding a number of offices, the higher consumption by units like the datacenter and the inclusion of new offices resulted in B3's consumption rising.

	Energy Consumption in Brazil (Mwh)	Emissions Factor (Average annual tCO2eq/Mwh)	Scope 2 Emissions Brazil (tCO2eq)
2016	26,096	0.0817	2,130.67
2017	31,347	0.0927	2,919.87
Change	20.12%	13.50%	37.04%

Results - Absolute Emissions Scope 3

Scope 3 emissions consist of indirect emissions related to B3's activities. 5 categories of emissions sources for reporting were used which are applicable to and reportable by the stock exchange.



B3 GHG Emissions – Scope 3

- Category 1: Purchased goods and services - 2.75 tCO2e
- Category 5: Waste generated in operations -54.49 tCO2e
- Category 6: Business travel - 714.31 tCO2e
- Category 7: Employee commuting - 719.32 tCO2e
- Other scope 3 emissions (Fugitive)- 1.94 tCO2e

*Included the scope 3 categories defined by the Brazilian GHG Protocol program.

Results - Absolute Emissions

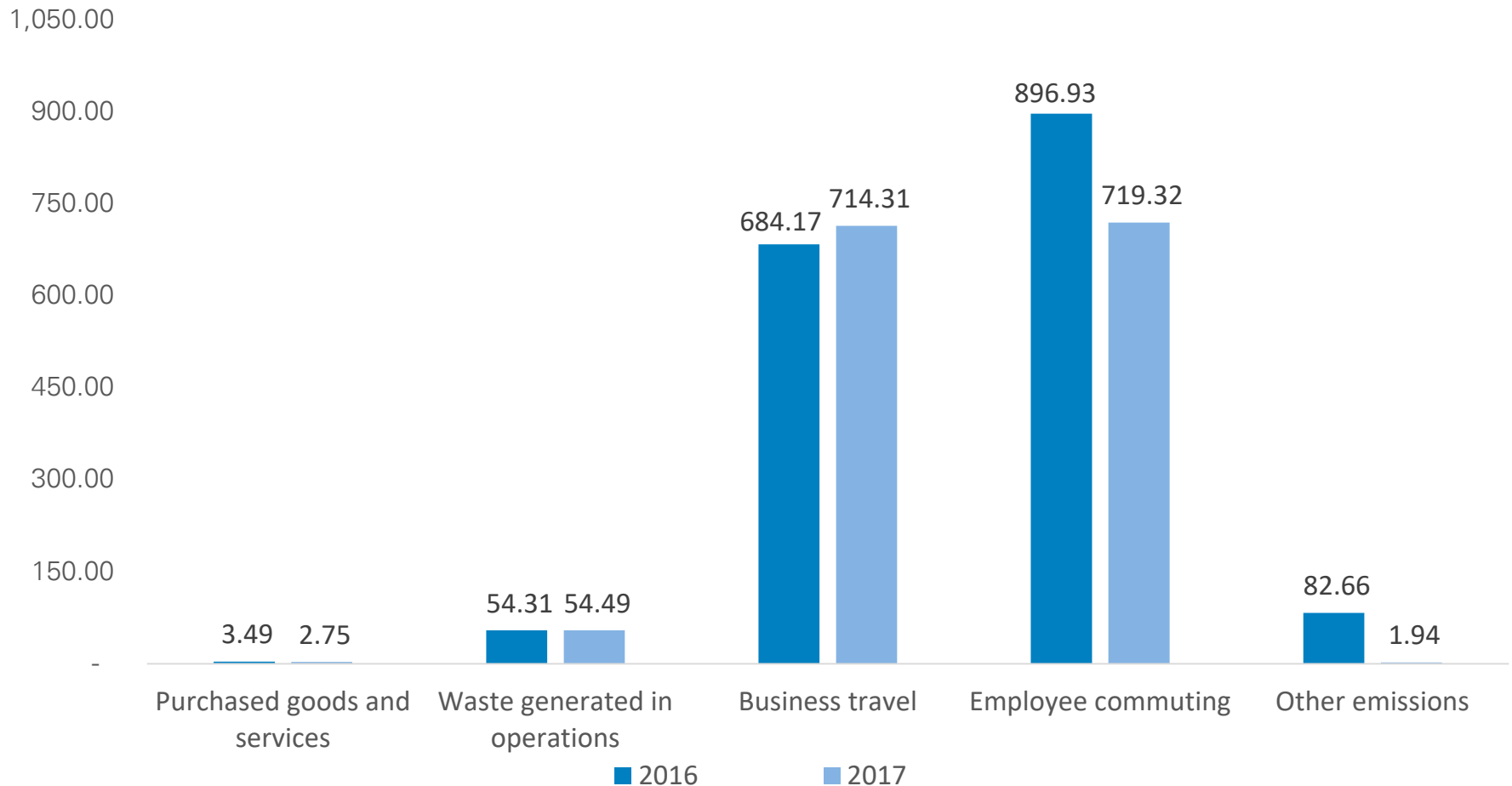
Scope 3

Source of Emission	2017				
	Other gases (t)	tCO2	tCH4	tN2O	tCO2e
Category 1: Purchased goods and services	-	2.63	0.00	0.00	2.75
Category 5: Waste generated in operations	-	-	2.18	-	54.49
Category 6: Business travel	-	705.94	0.02	0.03	714.31
Category 7: Employee commuting	-	693.82	0.26	0.06	719.32
Other emissions under Scope 3 (Fugitive)	0.0014	-	-	-	1.94

According to the table above, scope 3 emissions primarily stemmed from the category Business Travel and Employee Commuting, jointly accounting for 96% of the total emissions under this scope.

Results - Absolute Emissions Scope 3

B3 2017 – GHG Emissions – Scope 3



Results - Absolute Emissions

Scope 3

Other Scope 3 emissions (Fugitive)

There was just one sharp reduction in CO_{2e} of 80.72 tonnes, related to the reduction in the area occupied by B3 in the condominium of the BVRJ unit.

Category 1: Purchased goods and services

This category embraces the emissions from the transportation of documents by motorbike couriers. In 2017, there was a reduction in mileage, leading to a reduction of approximately of 0.73 tonnes of CO_{2e}.

Category 5 - Waste generated in operations

Category 5 experienced a modest increase of 0.32% in its emissions, where its emissions are concentrated on the disposal of waste in a landfill, accounting for 100% of this category's emissions. Despite lower incineration-related emissions, the greater amount of waste sent to landfill raised overall category 5 emissions.

Allocation	2016 tCO2e	2017 tCO2e
Landfill	54.09	54.49
Incineration	0.22	-

Results - Absolute Emissions

Scope 3

Category 6 - Business travel

Category 6 (business travel) forms the second largest source of scope 3 emissions of B3. This category includes business travel and employee commuting by taxi and other forms of transportation, as shown below.

Category 6 (Business travel)	2016 tCO2e	2017 tCO2e
Transportation of employees/directors (taxi)	52.74	45.75
Air Travel	631.43	668.56

In 2017, emissions due to taxi journeys decreased by around 13% over 2016. This change was due to the reduction in mileage incurred in 2017, as shown in the table below.

	2016	2017	Change
KM Traveled Taxi	367,018.00	312,386.89	-14.9%
Average annual percentage of ethanol in gasoline	27.00%	27.00%	0.0% ¹

¹ Difference between percentages

Results - Absolute Emissions

Scope 3

Emissions from flights increased in 2017 (by around 6%) due to the increase in distances traveled in the sections flown. The increase in distance traveled was accompanied by growth in the number of flights, as can be seen in the table below.

	2016	2017	Change
Number of flights	3,095	4,186	35.3%
Short KM	497,645	709,356	42.5%
Medium KM	1,200,934	1,938,694	61.4%
Long KM	4,453,293	3,862,522	-13.3%
Total KM	6,151,871	6,510,572	5.8%
tCO2e	631.43	668.56	5.9%

Results - Absolute Emissions

Scope 3

Category 7 - Employee Commuting

In 2017, emissions from employee commuting accounted for 48% of the total scope 3 emissions. The data was obtained from an online survey applied to B3 employees and trainees. 50.96% answered the survey for this inventory, and those who did not answer had their emissions calculated by extrapolating the patterns observed in the answers obtained.

For 2017 we observed a 19.8% decrease in absolute emissions in this category compared with emissions in 2016 quantified for BM&FBOVESPA. This decrease was due to the exclusion of service providers from the calculation. In previous years the estimate for this category took into account service providers emissions, a practice that changed in 2017, thereby reducing the number of people included in the calculation.

Results - Absolute Emissions

Scope 3

Results of the Survey "How do you commute to B3?"

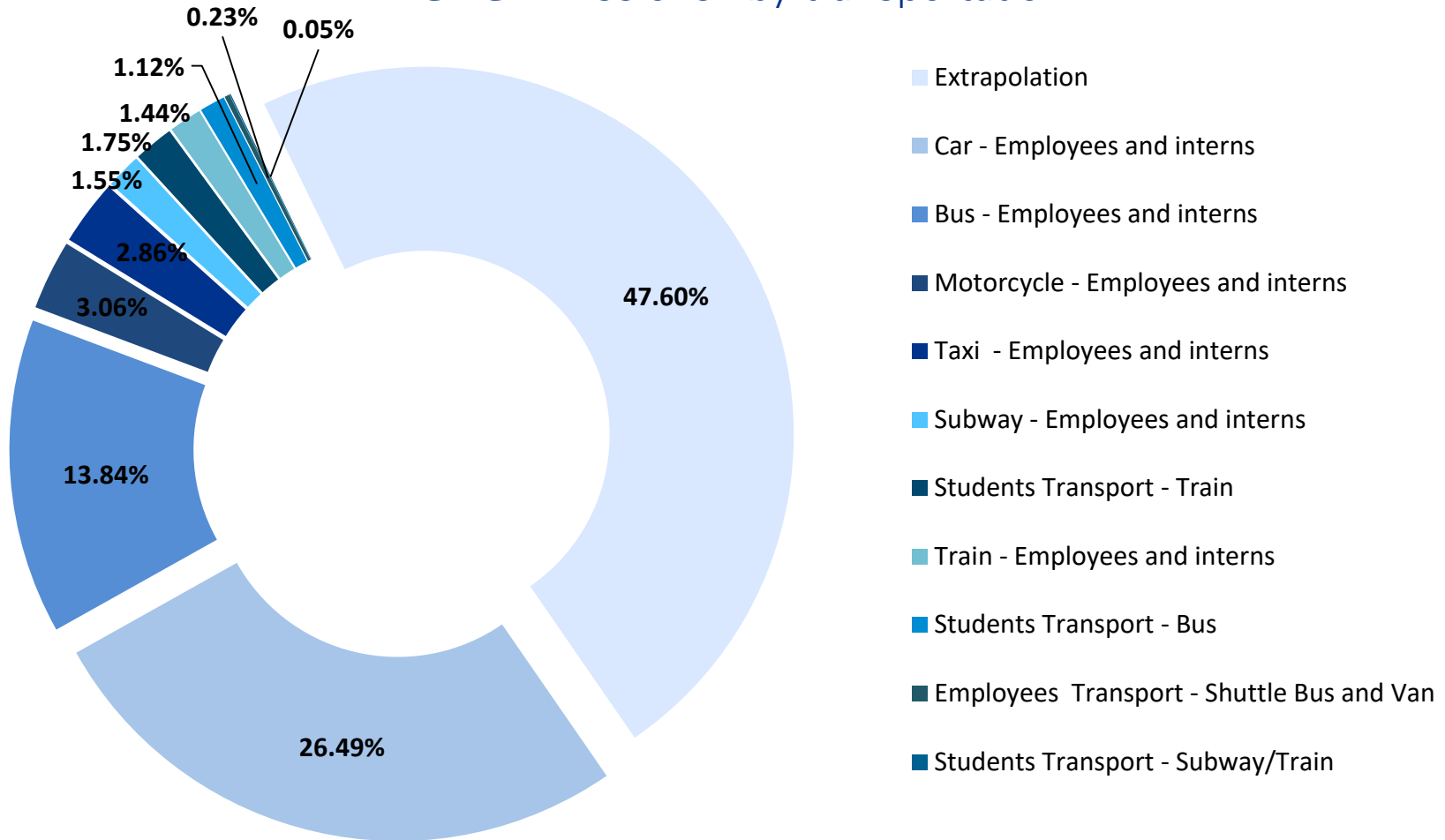
Result by form of transportation	2012		2013		2014		2015		2016		2017	
	Nº. of people	%	Nº. of people	%	Nº. of people	%	Nº. of people	%	Nº. of people	%	Nº. of people	%
Subway/train + Bus	364	23.40%	333	22.90%	198	18.00%	228.00	20.50%	300	22.49%	77	6.92%
Subway/train	420	27.00%	326	22.40%	223	20.20%	193	17.40%	211	15.82%	385	34.59%
Car	155	10.00%	155	10.60%	130	11.80%	125	11.30%	139	10.42%	198	17.79%
Bus	122	7.80%	104	7.10%	149	13.50%	107	9.60%	126	9.45%	182	16.35%
Subway/train + car	217	13.90%	171	11.70%	121	11.00%	88	7.90%	110	8.25%	39	3.50%
Motorcycle	42	2.70%	54	3.70%	45	4.10%	50	4.50%	44	3.30%	49	4.40%
On foot	34	2.20%	43	3.00%	50	4.50%	35	3.20%	36	2.70%	36	3.23%
Subway/train on foot	28	1.80%	18	1.20%	24	2.20%	35	3.20%	58	4.35%	5	0.45%
Bus + on foot	12	0.80%	22	1.50%	12	1.10%	16	1.40%	19	1.42%	2	0.18%
Bicycle	3	0.20%	13	0.90%	6	0.50%	5	0.50%	10	0.75%	7	0.63%
Others*	160	10.30%	218	15.00%	144	13.10%	228	20.50%	281	21.06%	133	11.95%
Total	1,557	100%	1,457	100%	1,102	100%	1,110	100%	1,334	100%	1,113	100%

* The item "Other" primarily denotes taxis, lifts and the combination of 3 different forms of transportation.

Results - Absolute Emissions Scope 3

B3

GHG Emissions- by transportation



Results - Absolute Emissions

Biogenic and fugitive emissions

Emissions resulting from the combustion of biofuels are different and were therefore treated differently to those deriving from the combustion of fossil fuels. The combustion of biomass has a neutral CO₂ emission. This assumption is made because it considers that the CO₂ released during the combustion of biomass is equal to the CO₂ absorbed from the atmosphere during photosynthesis, meaning it can be considered neutral. Emissions of CH₄ and N₂O cannot be considered neutral because these gases are not removed from the atmosphere during the biomass life-cycle. In this case the emissions of CH₄ and N₂O were included in scope 1.

In the case of Brazil, all diesel sold contains a fraction of biodiesel (Law 11097 issued 1/13/2005) and all Brazilian gasoline must contain a variable fraction of biogenic fuel, i.e ethanol. To record diesel and gasoline consumption it was therefore necessary to segregate the fossil fuel portion from the renewable portion. In 2017 the gasoline and diesel oil produced in Brazil contained an average 27% anhydrous ethanol and 7.8% biodiesel respectively. The GHG emissions relating to these percentages of biomass fuels were duly deducted from the company's total emissions.

The table below presents the emissions for scopes 1, 2 and 3 resulting from the burning of biomass fuels in B3's activities in 2017. The emissions of R-22 and R141-B refrigerant gases are also reported, despite the fact the greenhouse gases are not included in the Kyoto protocol as they are already regulated by the Montreal protocol, which restricts the emissions of gases that damage the ozone layer.

Results - Absolute Emissions

Biogenic and fugitive emissions

Scope	Source of emission	Fuel consumed	Neutral emissions (tCO2e)
Scope 1	Stationary sources	B5 Diesel	5.93
	Mobile sources	B5 Diesel	0.15
		Gasoline	1.27
		Hydrated ethanol	3.22
Scope 2	Purchased electricity (generator)	B5 Diesel	3.80
Scope 3	Mobile sources	B5 Diesel	8.92
		Gasoline	65.84
		Hydrated ethanol	127.51
		Extrapolation	183.52

Scope	Source of emission	Gas Consumed	Emissions of Montreal protocol gases (tCO2e)
Scope 1	Fugitive Sources	R-22	624.45
		R141-B	21.89

Results – Emissions Intensity

B3 uses the following 4 indicators to assess its GHG emissions performance:

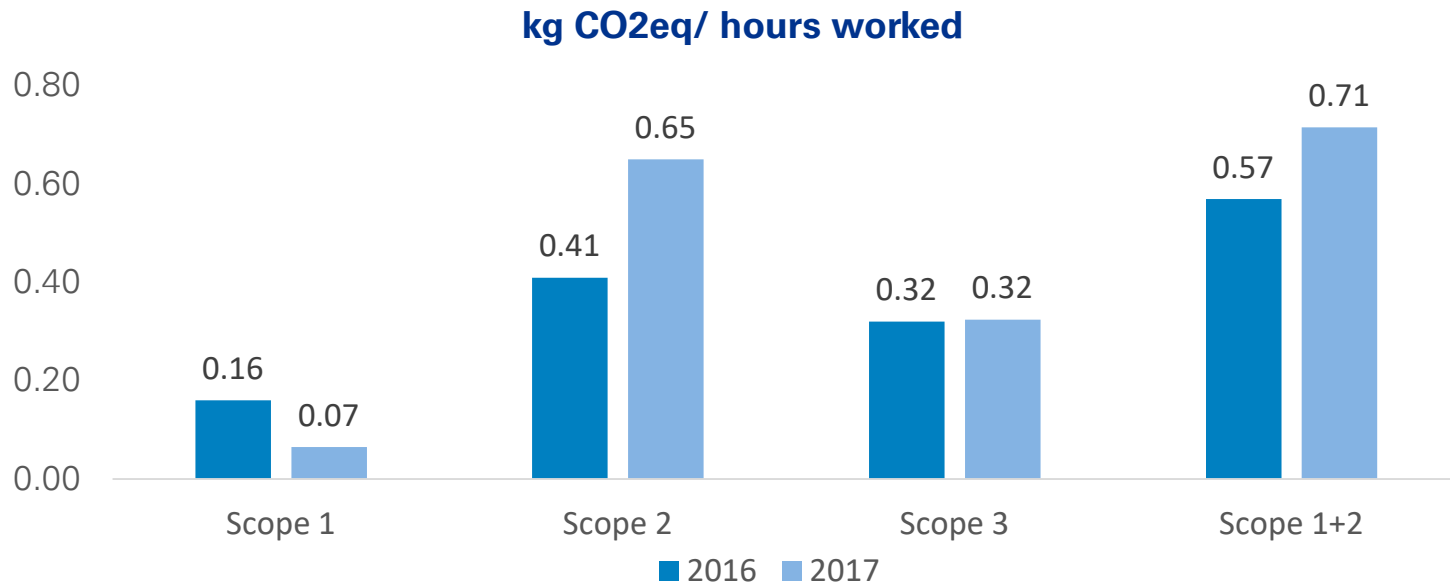
- Intensity of emissions by hours worked
- Intensity of emissions by gross revenue
- Intensity of emissions by trading volume - Bovespa Segment
- Intensity of emissions by trading volume - BM&F Segment

Results - Emissions Intensity

Intensity kg CO₂eq/ hours worked

The quantification of the emissions by hours worked shows the participation of company staff and trainees in the company's emissions. We emphasize that the quantification of this metric for the 2016 BM&FBOVESPA inventory included service providers, meaning a comparative analysis against the B3 data for 2017 could contain distortions.

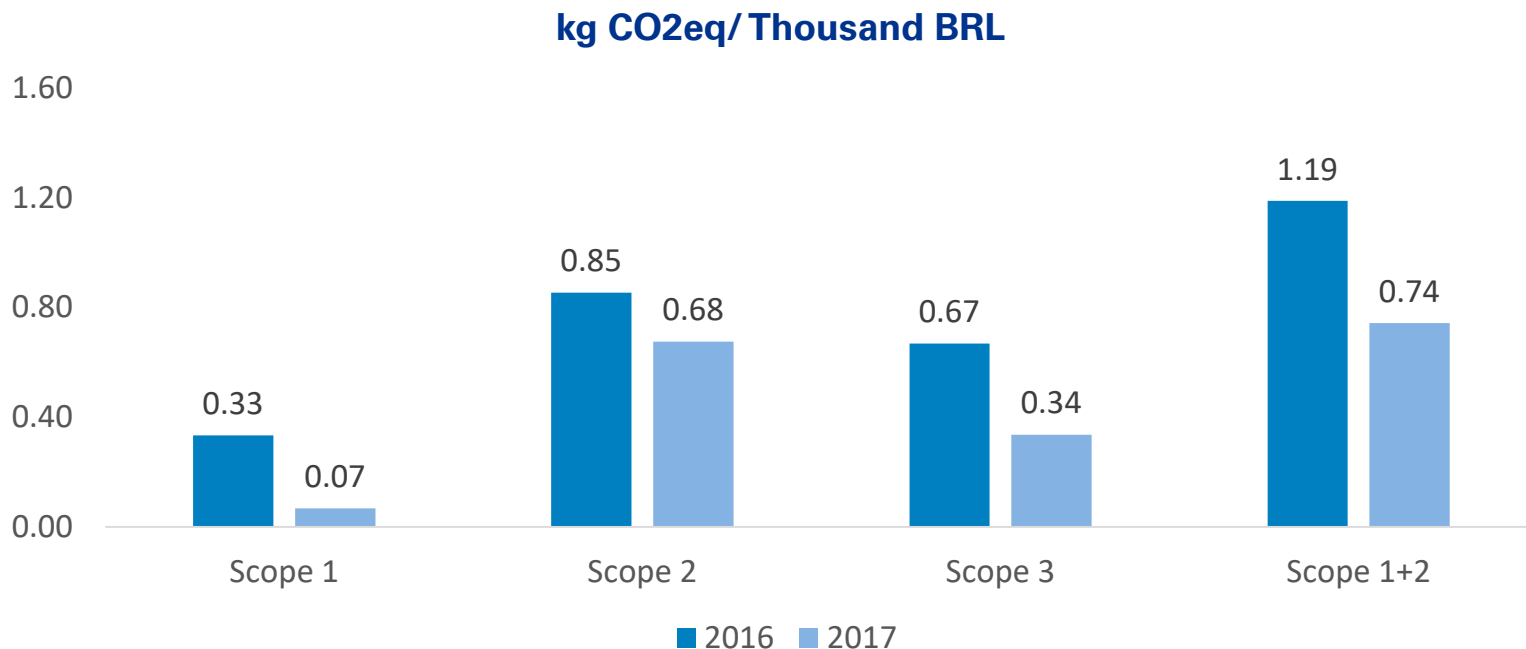
B3 reduced the intensity of scope 1 and increased scope 2, in line with the changes in absolute emissions. Scope 3 values held steady despite the decrease in emissions. This occurred because the number of hours worked did not include the time of service providers (third parties).



Results - Emissions Intensity

Intensity kg CO₂eq/ gross revenue

In 2017 B3's revenue rose noticeably, by around 72%, compared with the 2016 data for BM&FBOVESPA. This increase coupled with the decrease in scope 1 and 3 emissions, led to a sharp reduction of 80% and 50% for scopes 1 and 3 respectively. The reduction was more modest for scope 2, around 21%, because the emissions in 2017 were greater than in 2016, thereby diminishing the respective increase in the quotient (gross revenue).



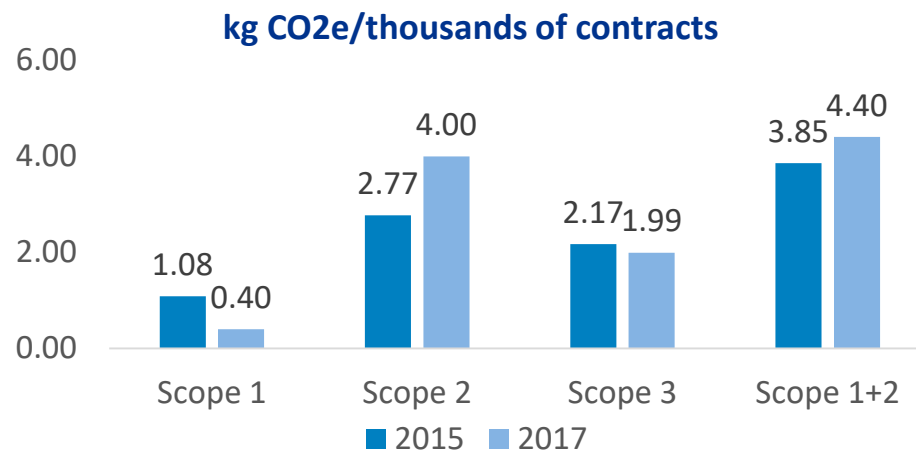
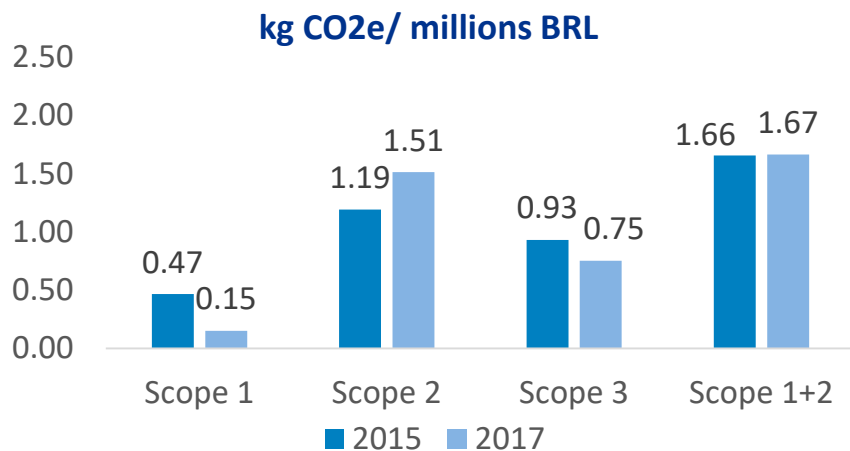
Results - Emissions Intensity

Intensity kg CO2eq/ trading volume

Intensity regarding trading price and volume follows the trends in absolute emissions for scopes 1, 2 and 3, with a reduction in scopes 1 and 3 and an increase in scope 2.

Despite a 7% increase in the total trading in millions of reais in the year, scope 2 followed the trend in absolute emissions, increasing by 27%. The rate for scopes 1 and 3 diminished more than the reduction in absolute emissions, 67% and 19%.

The volume of contracts traded diminished in 2017. The decreases for scope 1 and scope 3 were therefore greater, around 63% for scope 1 and 8% for scope 3. For scope 2, which saw a 6% decrease in the traded volume of contracts (quotient), the rate increase was greater, reaching 44%.



Reference

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