



BM&FBOVESPA S.A.

2016 Greenhouse Gas Emissions Inventory
Results

Corporate GHG Inventory – 2016

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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.

Since 2009, BM&FBOVESPA S.A. (hereinafter referred to as BM&FBOVESPA) has been compiling its GHG inventory, verified by a third party since 2010. In 2017, KPMG assisted BM&FBOVESPA in its compilation of its inventory based on data for 2016. 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.

BM&FBOVESPA's absolute emissions in 2016 amounted to 860.10 tCO₂e for scope 1, 2,201.05 tCO₂e for scope 2 and 1,721.57 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 271% increase over 2015. There was a substantial decrease of 33% in scope 2 emissions, due to the reduction of the Brazilian GRID emissions factor in 2016. The indirect scope 3 emissions, which fell by 8% on the previous year - were primarily due to the reduction in emissions relating to flights and a change to the commuting quantification (employees traveling to and from work) which segregated train and subway data, making a more precise quantification possible.

Since 2013 (bench line years of 2011 and 2012), BM&FBOVESPA 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 2016 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 - 2016 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).
- BM&FBOVESPA opted for the operational control approach, whereby the company is responsible for the emissions from sources and activities it exercises control over. Therefore, if BM&FBOVESPA 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:
 - **BM&FBOVESPA**
 - **Banco BM&F**
 - **Bolsa de Valores do Rio de Janeiro (BVRJ)**
 - **BM&FBOVESPA Supervisão de Mercados (BSM)**
 - **Instituto BM&FBOVESPA**
 - **International Offices: BM&FBOVESPA USA Inc. (New York and Shanghai) and BM&FBOVESPA UK Ltd. (London)**

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 for the company controls and is responsible for

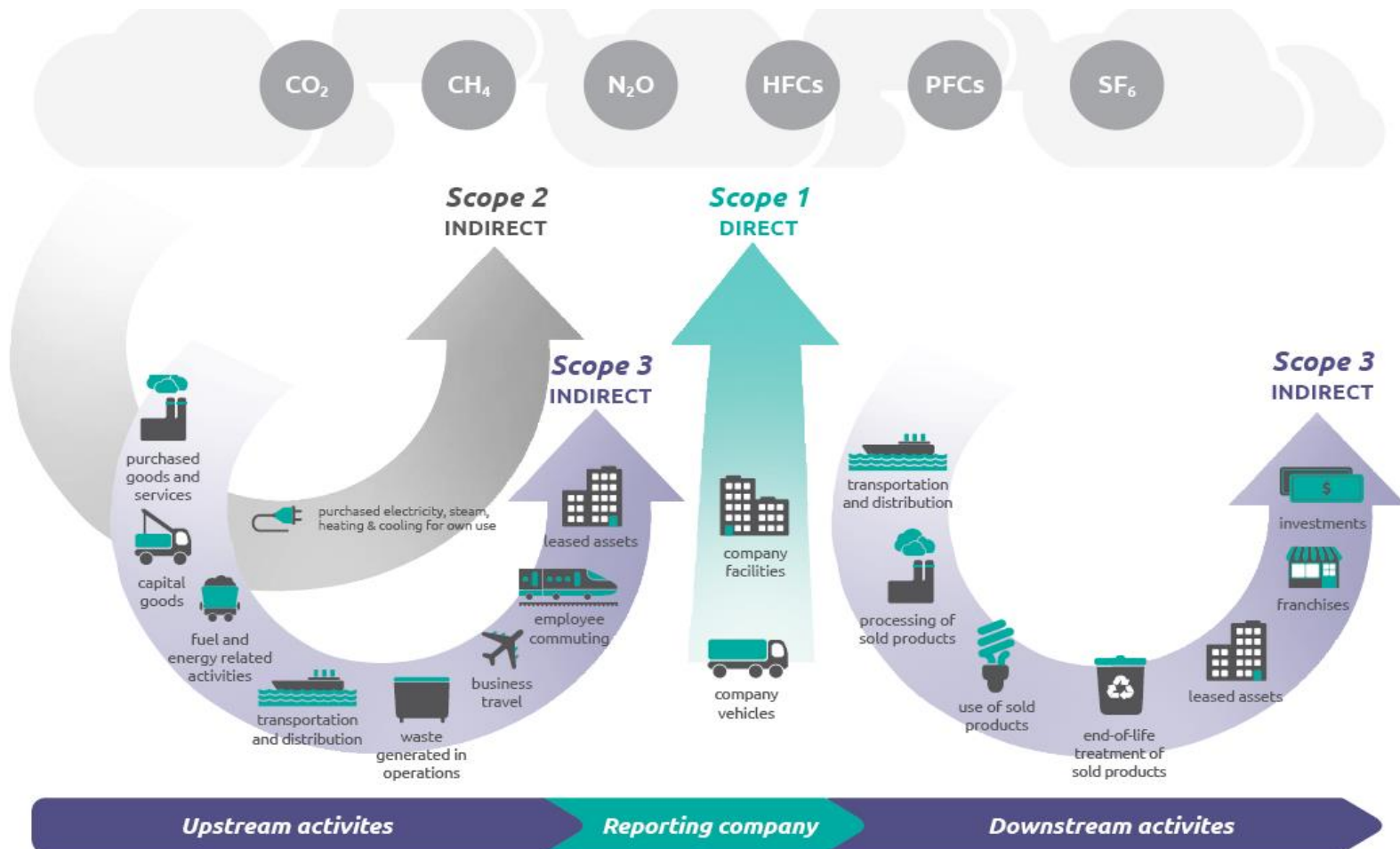
Scope 2

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

Scope 3

Other indirect GHG emissions – Other indirect emissions have emissions in the company's value chain which are not controlled by the stock exchange.

Inventory Limits



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

Inventory Limits

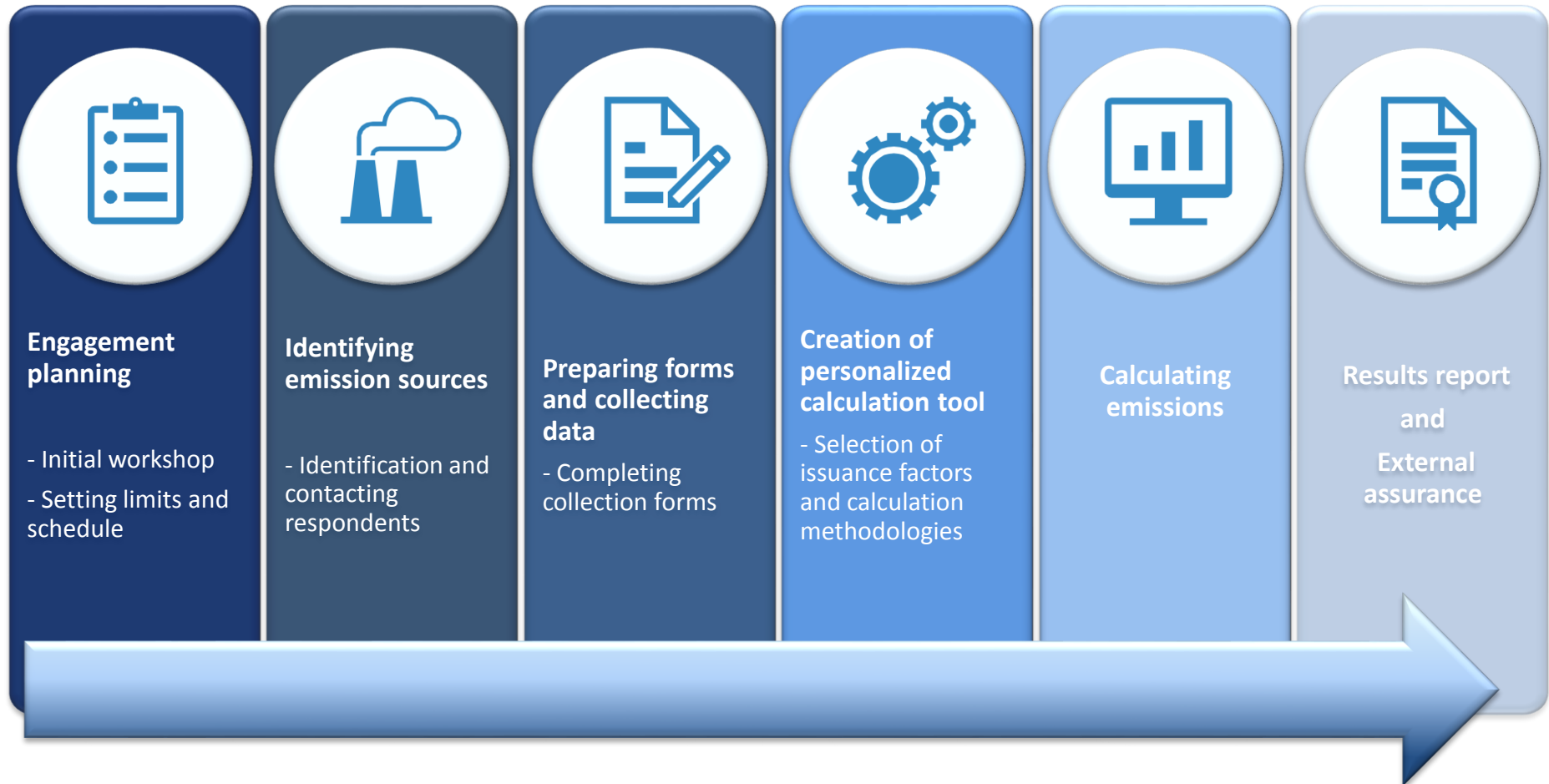
Based on the guidelines of the Brazilian GHG protocol program and activities of BM&FBOVESPA, this inventory identified and included the following emission sources:

BM&FBOVESPA 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 2016

- In March 2015 the units were carved out from BBM, no longer subject to the operational control of BM&FBOVESPA. The emissions of these units were not therefore included in the 2016 GHG inventory.
- In order to expand and enhance scope 3 figures for commuting, BM&FBOVESPA began recording emissions resulting from commuting by train and subway separately.

Stages of Compiling the GHG Emissions Inventory





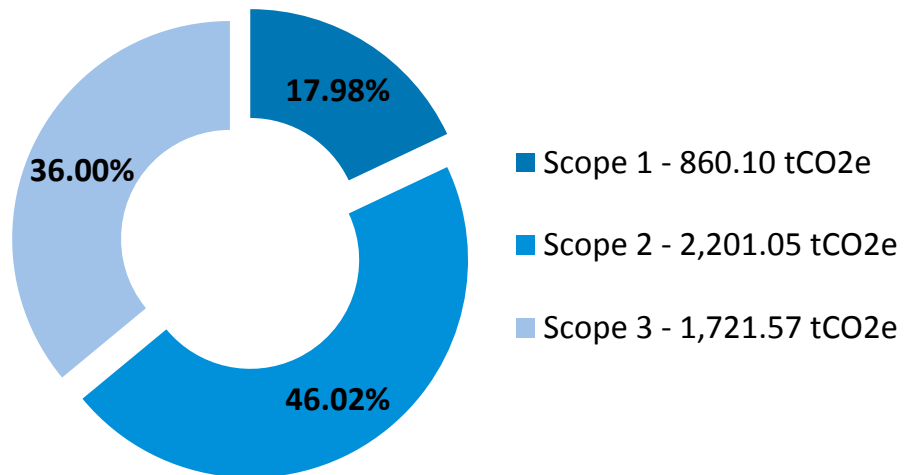
Results

Results – Absolute Emissions

This chapter presents the GHG inventory results of BM&FBOVESPA for 2016, developed based on information collected internally and the methodologies and assumptions used.

BM&FBOVESPA's total GHG emissions for 2016 amounted to 4,782.7 tCO₂e. As shown opposite, 18% of the stock exchange's emissions consisted of direct sources and sources controlled by the company (scope 1). Other emissions consisted of indirect emissions, with 46% belonging to scope 2 and 36% to scope 3.

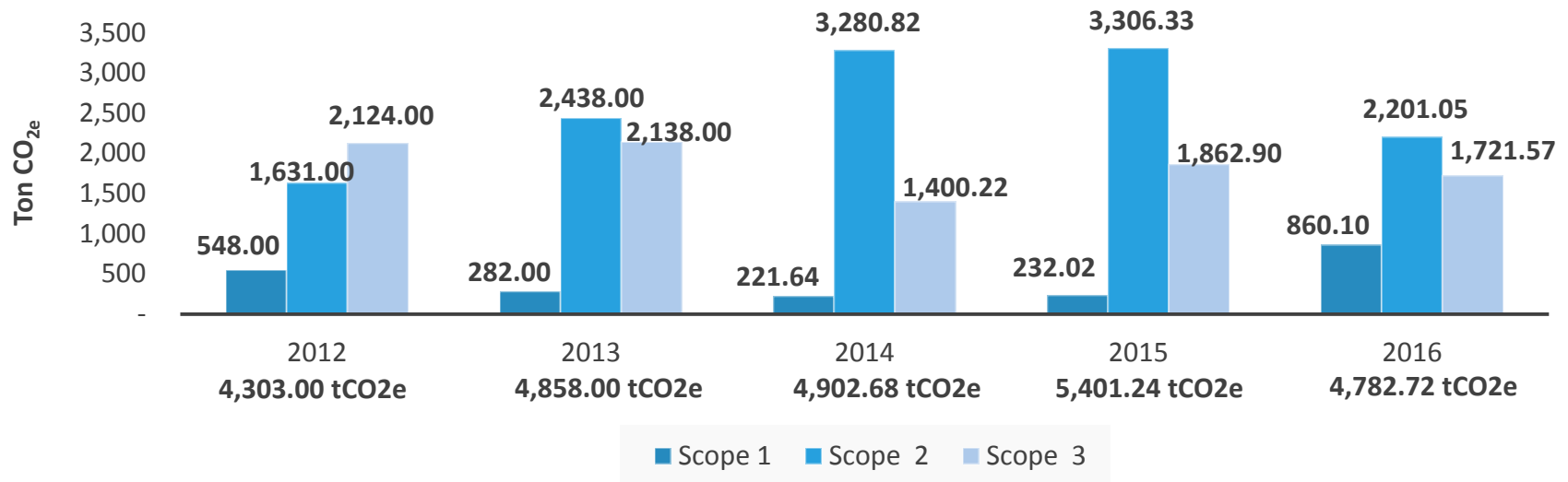
BM&FBOVESPA Emissions by Scope



Results – Absolute Emissions

BM&FBOVESPA

Emissions by Scope 2012 to 2016



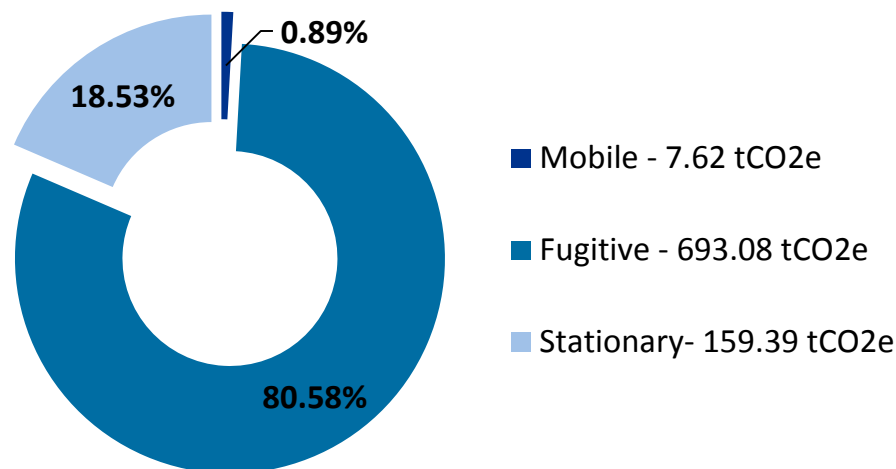
As is usual for financial and services companies, BM&FBOVESPA's direct emissions are much lower than its indirect emissions.

Compared with 2015 and 2016, the stock exchange's total emissions decreased by around 11%, primarily due to the reduction in the emissions factor for electricity purchased from the GRID.

Results - Absolute Emissions Scope 1

The largest scope 1 emission was found in fugitive sources, more specifically the replacement of air-conditioning assets. Although the mass of gas was low (0.3796 tonnes), its heating potential is very high, making it an important source of emissions of the company when converted to CO₂e.

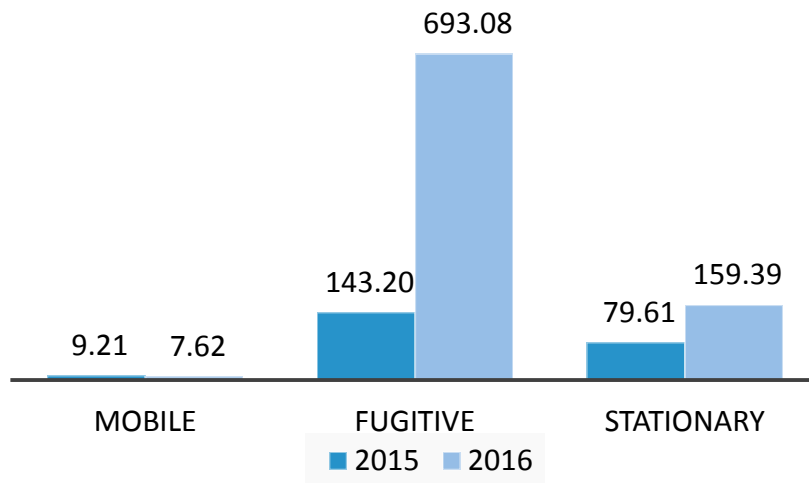
BM&FBOVESPA GHG Emissions - Scope 1



Source of Emission	tCO ₂	tCH ₄	tN ₂ O	tHFCs	tCO ₂ e
Mobile	7.31	0.003	0.001	0.00	7.62
Fugitive	1.60	0.00	0.00	0.38	693.08
Stationary	158.46	0.02	0.001	0.00	159.39

Results – Absolute Emissions

Scope 1



Scope 1 emissions rose by approximately 271% over 2015. This increase is due to the increase in the mass of refrigerant gases replaced in 2016.

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.

These replacements raised fugitive emissions by 384%. Because of this increase, the importance of this emission source in scope 1 rose from 62% in 2015 to 81% in 2016.

In 2016, emissions from stationary and mobile sources accounted for 19% of the total scope 1 emissions. The stationary emission source rose by 100% in absolute emissions, which is due to the higher consumption of diesel at the datacentre. Mobile source emissions contracted by 17% over 2015.

Results – Absolute Emissions

Scope 1

Mobile sources

Scope 1 mobile emissions stem from the use of vehicles by the company. BM&FBOVESPA has a very small fleet, which explains the low emissions compared with other sources comprising this scope. In 2016, the stock exchange's fleet ran on ethanol, gasoline and diesel, with gasoline accounting for 69% of the emissions from this source.

In 2016, the percentage of biodiesel in diesel remained at 7%, unchanged on 2015, but there was a modest change in the annual average of ethanol in gasoline, which rose to 27% in 2016 compared with 26.6% in 2015.

The reduction in emissions from this source is due to the change in the fuel consumption matrix in 2016, which saw a decrease in the consumption of diesel and increase in the consumption of gasoline. Emissions consequently dropped as gasoline is less carbon intensive than diesel, as can be seen in the table below:

Source of Emission	Activity	Fuel	2015		2016	
			Consumption in liters	tCO2e	Consumption in liters	tCO2e
Mobile	Company fleet	Ethanol	3,405.28	0.05	2,924.76	0.04
Mobile	Company fleet	Diesel	1,925.21	4.74	951.51	2.34
Mobile	Company fleet	Gasoline	2,601.75	4.42	3,103.61	5.24

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 2016 came from generators, accounting for approximately 91% of emissions. We emphasize that this scope only took into account generators owned by the stock exchange itself. 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 73% of stationary source emissions, rising by 206% between 2015 and 2016. This increase in the data center's emissions was a direct consequence of its higher diesel consumption.

Source of Emission	Activity	Fuel	tCO2e
Stationary	Canteen	Natural Gas	7.73
Stationary	Canteen	LPG	3.39
Stationary	Generator	Diesel Oil	145.66
Stationary	Heater	LPG	2.62

Results – Absolute Emissions

Scope 1

Fugitive Sources

In 2016, fugitive emissions primarily stemmed from the replacement of CO₂ in the units' fire extinguishers (1.60 tonnes) and the replacement of R407C gases (0.32 tonnes) and R410A (0.06 tonnes). R-22 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 99.77% of the emissions from this source and 80% of the absolute emissions in scope 1.

Scope	Source of Emission	Activity	2015		2016	
			Gases (t)	tCO2e	Gases (t)	tCO2e
1	Fugitive	Extinguishers – CO2	1.00	1.00	1.60	1.60
1	Fugitive	Air conditioning – R134A	0.01	15.73	0.00	0.00
1	Fugitive	Air conditioning – R407C	0.06	99.34	0.32	570.20
1	Fugitive	Air conditioning – R410A	0.01	27.14	0.06	121.28

Results - Absolute Emissions

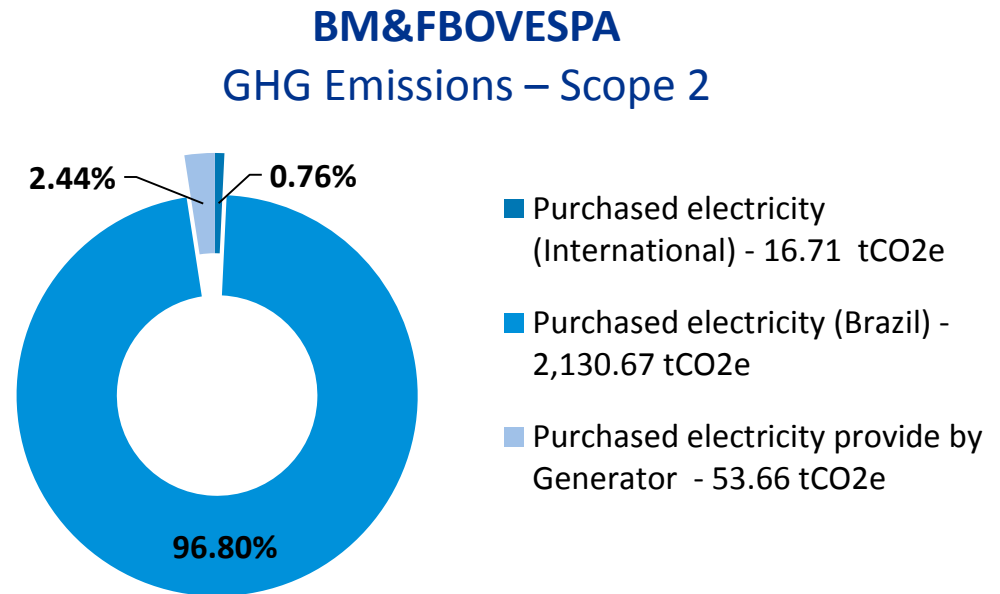
Scope 2

Scope 2 emissions consist of emissions from energy (electricity and steam) purchased externally. In 2016, BM&FBOVESPA consumed 26.10 GWh from the Brazilian electricity grid its operations, an increase of 0.37% compared with 2015.

In 2016, the emissions associated with this scope accounted for 46% 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 domestic 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 0.8% of scope 2.

The emissions released by generators operated by third party supplying energy to BM&F accounted for 2.4% of scope 2 emissions.



Results – Absolute Emissions

Scope 2

Source of Emission	tCO ₂	tCH ₄	tN ₂ O	tCO ₂ e
International Energy Purchases	16.71	-	-	16.71
Brazil Energy Purchases	2,130.67	-	-	2,130.67
Generator Energy Purchases	53.33	0.01	0.0005	53.66

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 0.37% in 2016. Despite the modest increase in consumption, emissions stemming from purchased energy in Brazil dropped sharply by 34% due to the modification of the GRID emissions factor.

The GRID emissions factor dropped by 34% in 2016. This 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.

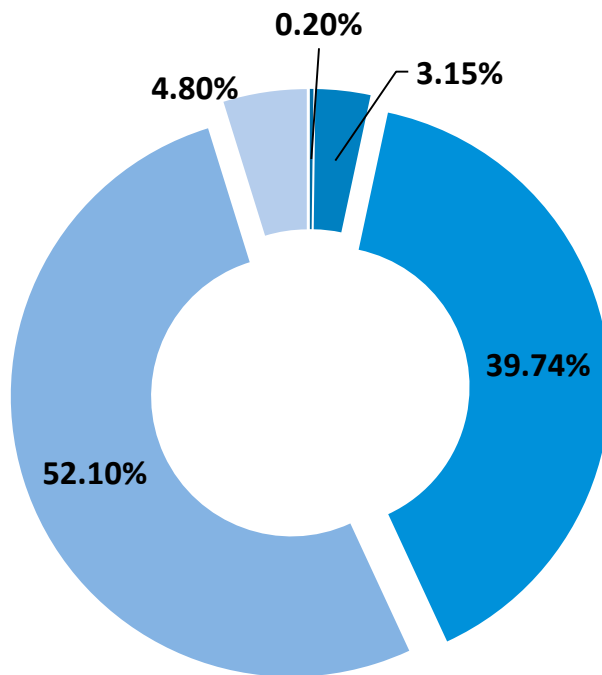
The table below presents the stock exchange's electricity consumption variance between 2015 and 2016 and the variance in the GRID emissions factor, thereby justifying the reduction in this scope's emissions.

	Energy Consumption in Brazil (MWh)	Emissions Factor (Average annual tCO ₂ eq/MWh)	Emissions scope 2 Brazil (tCO ₂ eq)
2015	26,001	0.1244	3,227.61
2016	26,096	0.0817	2,130.67
Change	0.37%	-34.32%	-33.99%

Results – Absolute Emissions

Scope 3

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



BM&FBOVESPA

GHG Emissions– Scope 3

- Category 1: Purchased goods and services - 3.49 tCO₂e
- Category 5: Waste generated in operations -54.31 tCO₂e
- Category 6: Business travel - 684.17 tCO₂e
- Category 7: Employee commuting - 896.93 tCO₂e
- Other scope 3 emissions (Fugitive)- 82.66 tCO₂e

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

Results – Absolute Emissions

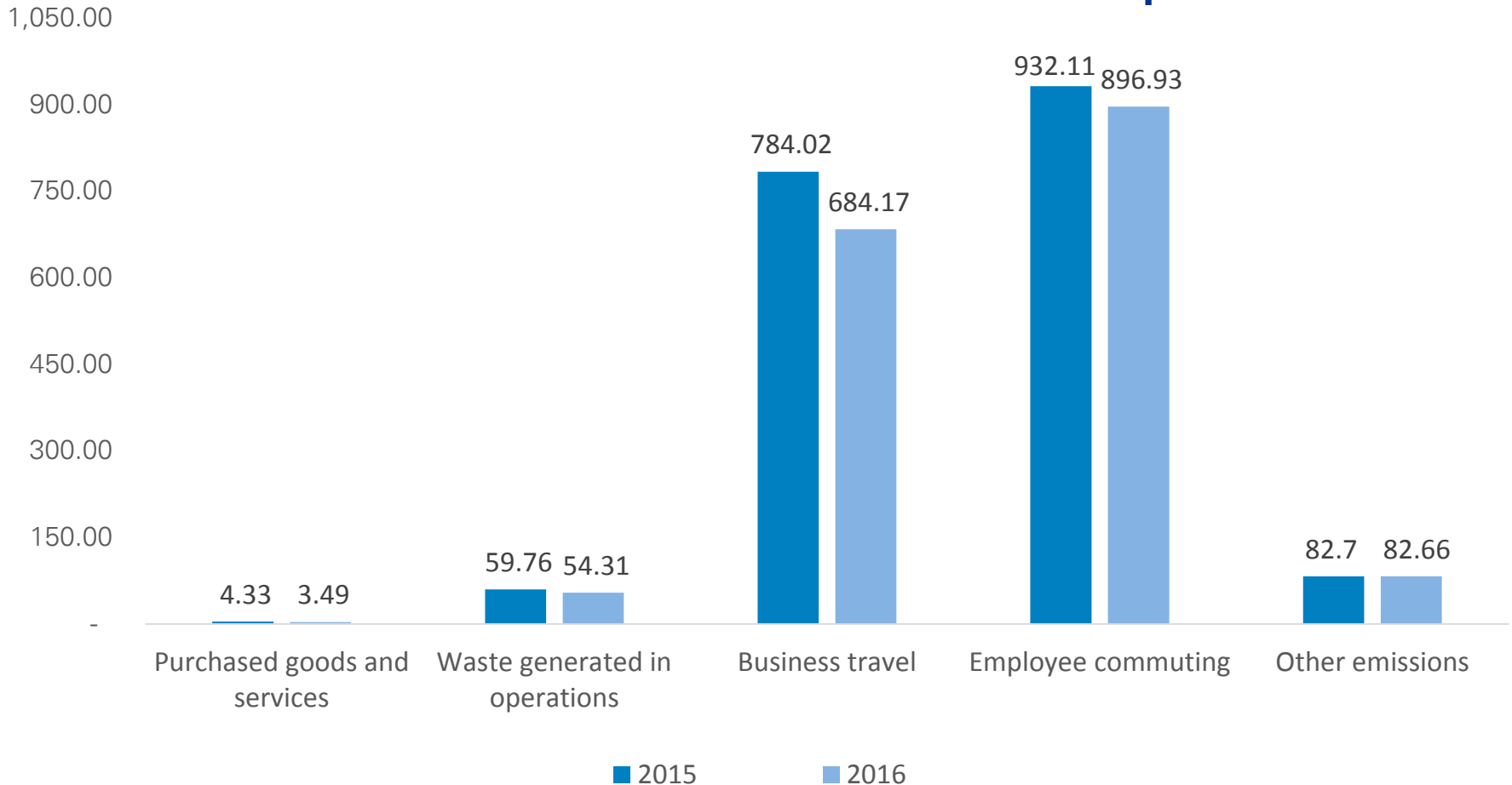
Scope 3

Source of Emission	2016				
	Other gases (t)	tCO2	tCH4	tN2O	tCO2e
Category 1: Purchased goods and services	0.00	3.33	0.00	0.00	3.49
Category 5: Waste generated in operations	0.00	0.21	2.16	0.00	54.31
Category 6: Business travel	0.00	675.87	0.02	0.03	684.17
Category 7: Employee commuting	0.00	866.64	0.29	0.08	896.93
Other emissions under Scope 3 (Fugitive)	0.06	0.00	0.00	0.00	82.66

According to the table above, scope 3 emissions primarily stemmed from the category Business Travel and Employee Commuting, jointly accounting for 92% of the total emissions under this scope.

Results - Absolute Emissions Scope 3

BM&FBOVESPA 2016 – GHG Emissions – Scope 3



Results – Absolute Emissions

Scope 3

Other Scope 3 emissions (Fugitive)

Emissions from this source remained virtually unchanged. There was just a reduction in CO_{2e} of 0.01 tonnes, related to reducing the replacement of refrigerant gas 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 2016, there was a reduction of 0.85 tonnes or 20% over 2015.

Category 5 - Waste generated in operations

Category 5 emissions are concentrated in the disposal of waste in landfills, accounting for 99.6% of the emissions in this category. For this category, the largest emissions decrease occurred in contaminated waste disposed of by incineration. In 2016 absolute emissions contracted by 95% compared with 2015, due to the reduction in the amount of material sent for incineration.

The emissions for biological treatment were zero, because in 2015 this figure related to BBM in Porto Alegre (RS), a unit which was segregated at the start of 2015. In 2016 this emission was no longer therefore related to the business of BM&FBOVESPA.

Disposal method	2015 tCO2e	2016 tCO2e
Landfill	55.215	54.09
Incineration	4.541	0.22
Biological Treatment	0.006	-

Results – Absolute Emissions

Scope 3

Category 6 - Business travel

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

Category 6 (Business travel)	2015 tCO2e	2016 tCO2e
Transportation of employees/directors (taxi)	57.87	52.74
Air Travel	726.15	631.43

In 2016, emissions due to taxi journeys decreased by around 9% over 2015. This change was due to the reduction in mileage incurred in 2016 and the increase in the percentage of ethanol added to gasoline.

	2015	2016	Change
KM Traveled Taxi	378,094.69	367,018.00	-3.07%
Average annual percentage of ethanol in gasoline	26.59%	27.00%	0.41% ¹

¹ Difference between percentages

Results – Absolute Emissions

Scope 3

Emissions from flights decreased in 2016 (by around 13%) due to the decrease in distances traveled in the sections flown. The decrease in distance traveled was accompanied by a reduction in the number of flights, as can be seen in the table below.

	2015	2016	Change
Number of flights	3,773	3,095	-18%
Short KM	597,259	497,645	-17%
Medium KM	1,610,534	1,200,934	-25%
Long KM	4,653,176	4,453,293	-4%
Total KM	6,860,969	6,151,871	-10%
tCO2e	726.15	631.43	-13%

Results – Absolute Emissions

Scope 3

Category 7 - Employee Commuting

In 2016, emissions from employee commuting accounted for 52% of the total scope 3 emissions. The data was obtained from an online survey applied to employees, trainees and service providers of the stock exchange. 52.4% 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.

In addition to employees, trainees and service providers, the transportation of students of the BM&FBOVESPA Institute were also included in this category.

For 2016 we observed a 4% decrease in absolute emissions in this category compared with emissions in 2015. This reduction is due to segregating the quantification of emissions from trains and subways and the increasing number of employees using more than one type of transportation.

Results - Absolute Emissions

Scope 3

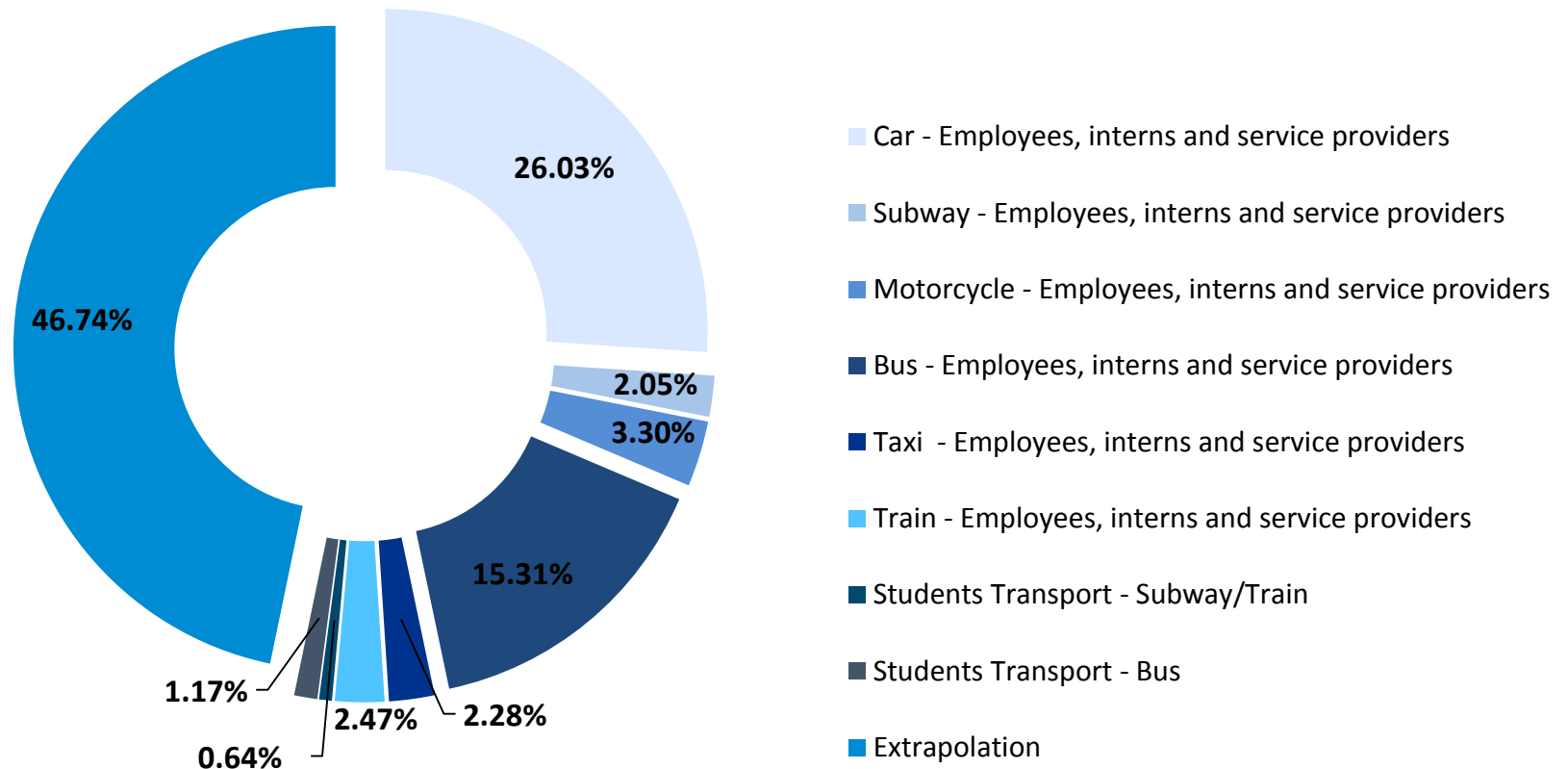
Results of the Survey "How do you commute?"

	2012		2013		2014		2015		2016	
Result by form of transportation	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%	300.00	22.49%
Subway/train	420	27.00%	326	22.40%	223	20.20%	193	17.40%	211.00	15.82%
Car	155	10.00%	155	10.60%	130	11.80%	125	11.30%	139.00	10.42%
Bus	122	7.80%	104	7.10%	149	13.50%	107	9.60%	126.00	9.45%
Subway/train + car	217	13.90%	171	11.70%	121	11.00%	88	7.90%	110.00	8.25%
Motorcycle	42	2.70%	54	3.70%	45	4.10%	50	4.50%	44.00	3.30%
On foot	34	2.20%	43	3.00%	50	4.50%	35	3.20%	36.00	2.70%
Subway/train on foot	28	1.80%	18	1.20%	24	2.20%	35	3.20%	58.00	4.35%
Bus + on foot	12	0.80%	22	1.50%	12	1.10%	16	1.40%	19.00	1.42%
Bicycle	3	0.20%	13	0.90%	6	0.50%	5	0.50%	10.00	0.75%
Other*	160	10.30%	218	15.00%	144	13.10%	228	20.50%	281.00	21.06%
Total	1,557	100%	1,457	100%	1,102	100%	1,110	100%	1,334	100%

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

Results - Absolute Emissions Scope 3

BM&FBOVESPA 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 2016 the gasoline and diesel oil produced in Brazil contained an average 27% anhydrous ethanol and 7% 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 BM&FBOVESPA's activities in 2016. The emissions of R-22 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	9.72
	Mobile sources	B5 Diesel	0.16
		Gasoline	1.28
		Hydrated ethanol	4.26
Scope 2	Purchased electricity (generator)	B5 Diesel	3.58
Scope 3	Mobile sources	B5 Diesel	10.83
		Gasoline	80.31
		Hydrated ethanol	146.00
		Extrapolation	202.36

Scope	Source of emission	Gas Consumed	Emissions of Montreal protocol gases (tCO2e)
Scope 1	Fugitive Sources	R-22	866.18
Scope 3	Other emissions under Scope 3	R-22	144.87

Results – Emissions Intensity

BM&FBOVESPA uses the following 4 indicators to assess its GHG emissions performance:

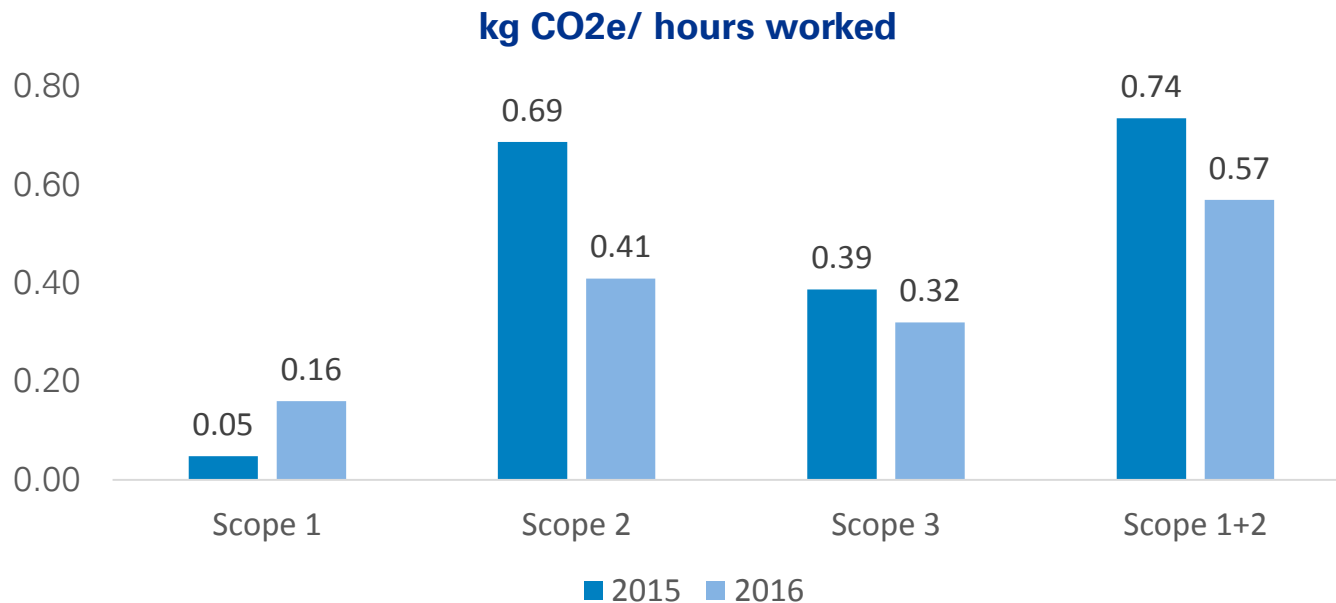
- Intensity of emissions by hours worked
- Intensity of emissions by Gross Revenue
- Intensity of emissions by trading volume - Bovespa Segment
- Intensity of emissions by trading volume - BM&F Segment

Results – Emissions Intensity

Intensity kg CO₂e/ hours worked

The quantification of the emissions by hours worked shows the participation of company staff, service providers and trainees in the company's emissions.

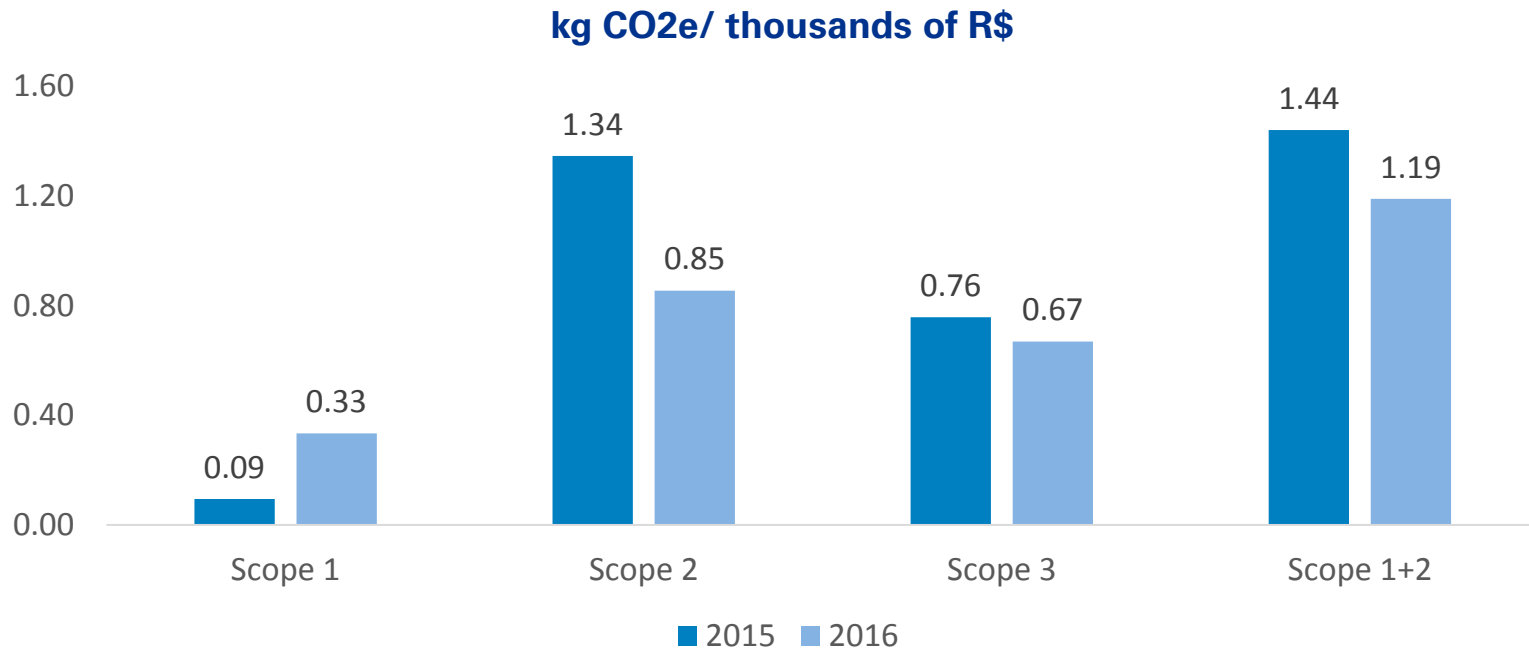
BM&FBOVESPA experienced an increase in scope 1 intensity and decrease in scope 2 and 3 intensity in line with the changes in absolute emissions, despite the 12% increase in the total number of employees between 2015 and 2016 (company staff, service providers and trainees).



Results – Emissions Intensity

Intensity kg CO₂e/ gross revenue

Revenue increased by 5% in 2016 compared with 2015. Despite this increase, the index followed the pattern of the emissions. Scope 1 accordingly experienced an increase in intensity and scopes 2 and 3 a decrease, which intensified due to the increase in revenue.



Results – Emissions Intensity

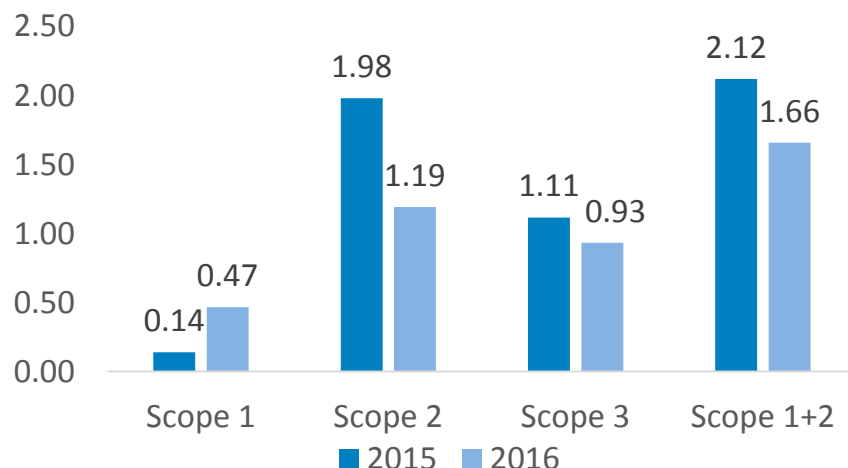
Intensity kg CO₂eq/ trading volume

The intensity for the trading volume followed the pattern of absolute emissions for scopes 1, 2 and 3. The trading amount and trading volume rose by 10% and 13% respectively in 2016.

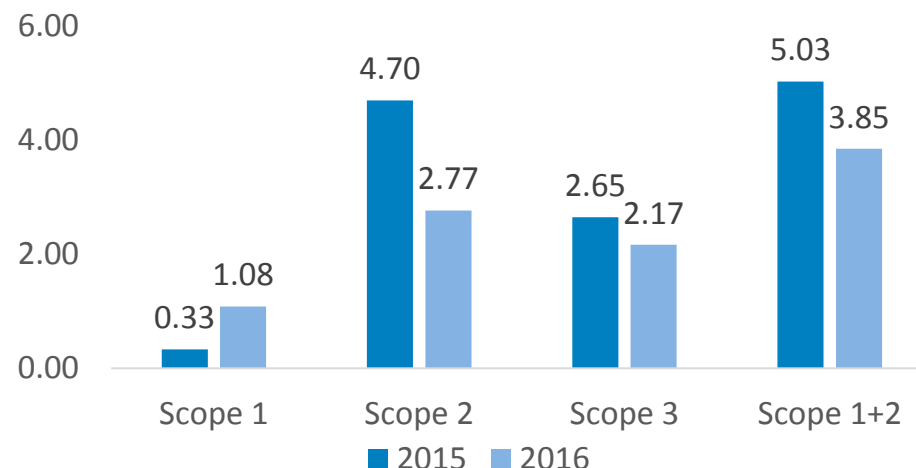
The growth in the number of contracts traded and amount traded coupled with the lower emissions in 2 and 3 led to a sharp decline in intensity for these scopes.

For scope 1, the increase in trading volume and trading amounts were not sufficient to reduce this scope's intensity due to the sharp increase in emissions between 2015 and 2016.

kg CO₂e/ millions of R\$



kg CO₂e/ thousands of contracts



References

- The Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard - Revised Edition - March 2004 - WRI/WBCSD.
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