



# ISTERRE

## Greenhouse gas inventory of the activities of the laboratory

*Simplified version*

Completed in 2019. Based on the activities of 2017.

*See the full version for more informations about perimeters, methodology, results, uncertainties and proposals for actions.*



# I. RESULTS OF THE GHG INVENTORY

Total greenhouse gas (GHG) emissions amounted to **1065 tonnes CO<sub>2</sub>e** in 2017.

## 1. DETAILS OF THE EMISSIONS PER SCOPE AND PER CATEGORY

### Scope 1 : Direct GHG emissions

N°	Categories	2017
		Total GHG emissions
		<i>tonnes CO<sub>2</sub>e</i>
2	Fuel combustion of the vehicles belonging to ISTERre	12
4	Cooling gas leaks from air-conditioning units	18
<b>SUB TOTAL SCOPE 1</b>		<b>30</b>

### Scope 2 : Indirect GHG emissions related to energy

N°	Categories	2017
		Total GHG emissions
		<i>tonnes CO<sub>2</sub>e</i>
6	Electric consumptions of ISTERre's buildings (Grenoble and Chambéry) and seismological stations	15
7	Gas consumptions of ISTERre's buildings for heating	83
<b>SUB TOTAL SCOPE 2</b>		<b>99</b>

### Scope 3 : Other indirect GHG emissions

N°	Categories		2017
			Total GHG emissions
			tonnes CO <sub>2</sub> e
8	GHG emissions related to energy not included in scope 1 and scope 2	Natural gas	18
		Diesel oil	3
		Electricity	9
		<b>Sub total category 8</b>	<b>30</b>
9	Purchased Goods and Services	Electricity outsourced servers	14
		Electricity synchrotrons use	50
		<b>Sub total category 9</b>	<b>64</b>
10	Capital Goods	IT infrastructure	22
13	Business Travel	Automobile travel	38
		Long-haul flights (>2500 km)	490
		Short and medium-haul flights (<2500 km)	117
		Rail travel	1
		Bus travel	12
		<b>Sub total category 13</b>	<b>657</b>
22	Employee Commuting	Electric bike	0
		Electric scooter	0
		Motorized two-wheelers	0
		Gasoline car	39
		Diesel oil car	119
		LPG car	0
		Electric car	1
		Hybrid car	0
		Bus	3
		Tramway	0
		Train	1
		<b>Sub total category 22</b>	<b>164</b>
<b>SUB TOTAL SCOPE 3</b>			<b>936</b>

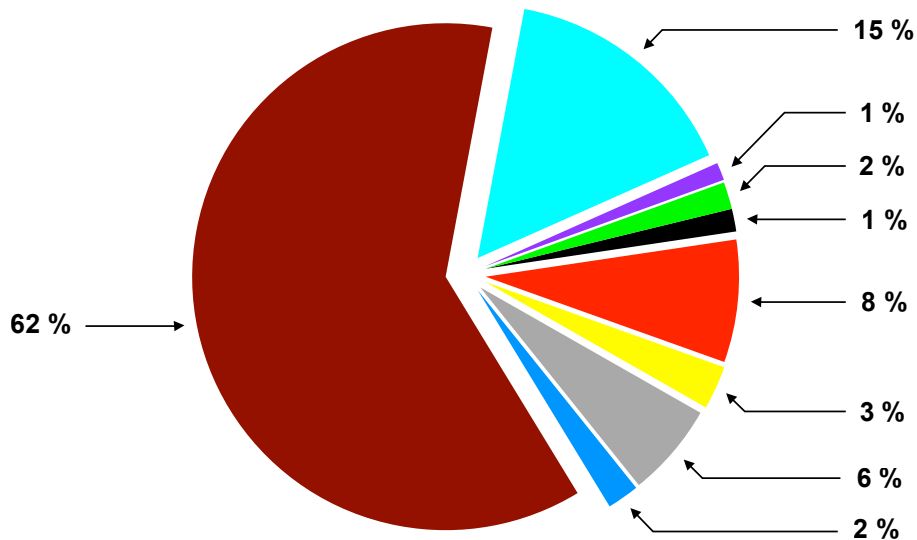
## 2. REPORT OF CONSUMPTIONS AND ACTIVITIES










Scope	N°	Category	Consumption	Unit	2017
Scope 1 : Direct GHG emissions	2	Fuel combustion of the vehicles belonging to ISTerre		Diesel liters	4 789
	4	Cooling gas leaks of air-conditioning units		Unit	14
Scope 2 : Indirect GHG emissions related to energy	6	Electric consumptions of ISTerre's buildings (Grenoble and Chambéry) and seismological stations		kWh	606 668
	7	Gas consumptions of ISTerre's buildings for heating		kWh	492 514
Scope 3 : Other indirect GHG emissions	9	Purchased Goods and Services	Electricity outsourced servers	kWh	248 305
			Electricity synchrotrons use	kWh	868 200
	10	Capital Goods	Laptops	Unit	39
			Desktop computers	Unit	3
			Screens	Unit	42
			Photocopiers	Unit	1
			Laser printers	Unit	1
	13	Business Travel	Automobile travel	km	150 291
			Long-haul flights (>2500 km)	km	2 195 535
			Short and medium-haul flights (<2500 km)	km	398 358
			Rail travel	km	243 486
			Bus travel	km	76 612
	22	Employee Commuting	Electric bike	kWh	303
			Electric scooter	kWh	0
			Motorized two-wheelers	km	557
			Gasoline car	km	150 262
			Diesel oil car	km	473 187
			LPG car	Liters	0
			Electric car	km	13 927
Hybrid car			km	0	
Bus			km	18 801	
Tramway			km	55 716	
Train			km	157 489	

### 3. RESULTS INTERPRETATION

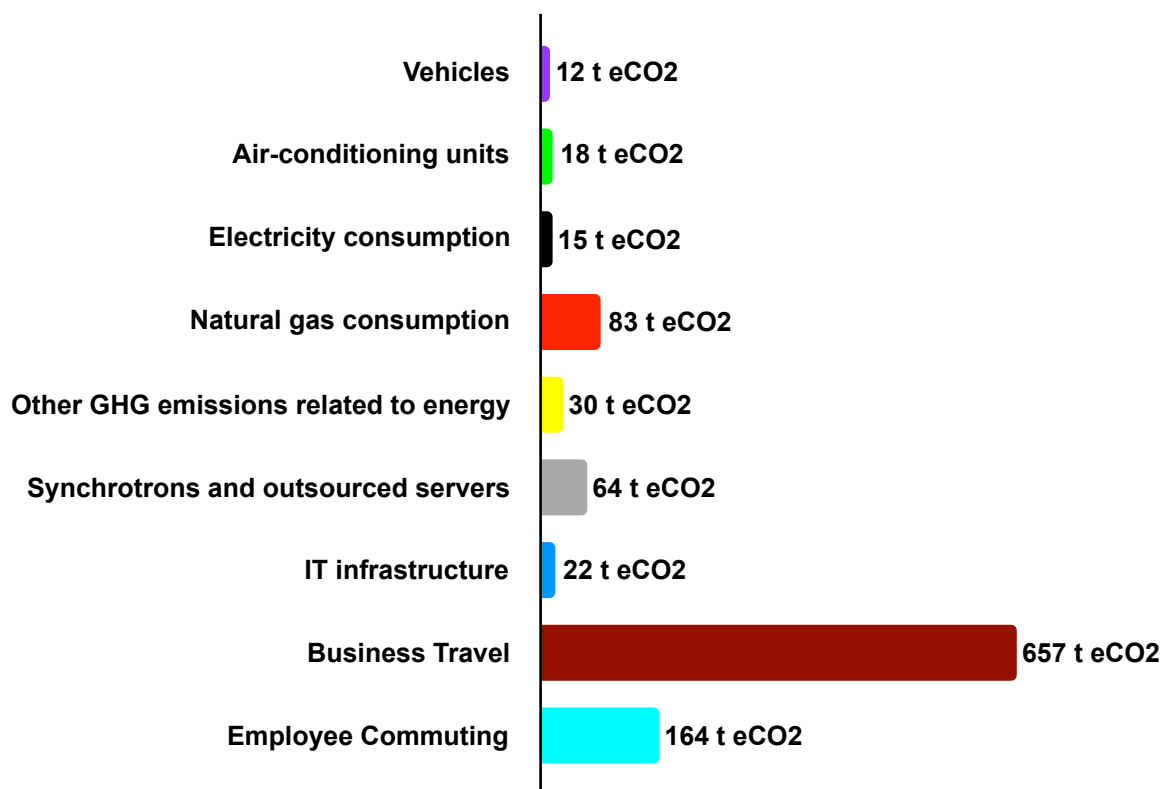
Total GHG emissions in 2017 : **1065 tonnes CO<sub>2</sub>e** being **4,2 tonnes CO<sub>2</sub>e** per agent.

**Share of GHG emissions per category in 2017**



	<b>Fuel combustion of the vehicles belonging to ISTERre</b>	<b>1 %</b>
	<b>Cooling gas leaks of air-conditioning units</b>	<b>2 %</b>
	<b>Electric consumptions of ISTERre's buildings (Grenoble and Chambéry) and seismological stations</b>	<b>1 %</b>
	<b>Natural gas consumptions of ISTERre's buildings for heating</b>	<b>8 %</b>
	<b>GHG emissions related to energy not included in scope 1 and scope 2</b>	<b>3 %</b>
	<b>Purchased Goods and Services</b> Synchrotrons and outsourced servers	<b>6 %</b>
	<b>Capital Goods</b> IT infrastructure	<b>2 %</b>
	<b>Business Travel</b>	<b>62 %</b>
	<b>Employee Commuting</b>	<b>15 %</b>

## GHG emissions per category



**TOTAL : 1065 tonnes CO<sub>2</sub>e**

Compared to the defined perimeter, **62 %** of ISTerre's GHG emissions in 2017 arise from business trip (**657 tonnes CO<sub>2</sub>e**).

Employee commuting account for **15 %** of ISTerre's GHG emissions in 2017 (**164 tonnes CO<sub>2</sub>e**).

Synchrotrons use and outsourced servers (data storage and calculation) represent **6 %** of ISTerre's GHG emissions (**64 tonnes CO<sub>2</sub>e**).

Emissions due to air conditioner leaks (**18 tonnes CO<sub>2</sub>e** being **2 %** of the GHG emissions) are almost equivalent to those related to the electricity consumption of buildings (combustion, transport and distribution), and comparable to those related to annual purchases of computer equipments (**22 tonnes CO<sub>2</sub>e** being **2 %** of the GHG emissions).

## 1. Natural gas

Total GHG emissions related to natural gas consumption : **101 tonnes CO<sub>2e</sub>**

→ Being **9 %** of the ISTerre's GHG emissions

Natural gas consumptions in 2017 :

- ISTerre Grenoble : **455 003 kWh** (OSUG-C)
- ISTerre Chambéry : **37 511 kWh** (Belledonne 8A-8B and Margériaz)

Natural gas consumptions per m<sup>2</sup> in 2017 :

- ISTerre Grenoble : **81,5 kWh/m<sup>2</sup>**
- ISTerre Chambéry : **51,2 kWh/m<sup>2</sup>**

Average French tertiary sector : **140 kWh/m<sup>2</sup>**

## 2. Consumption of electricity

Total GHG emissions related to power consumption : **24 tonnes CO<sub>2e</sub>**.

→ Being **2 %** of the ISTerre's GHG emissions

Power consumption in 2017 :

- ISTerre Grenoble : **572 529 kWh** (OSUG-C)
- ISTerre Chambéry : **30 197 kWh** (Belledonne 8A-8B and Margériaz)
- Seismological stations : **3 942 kWh**

Power consumption in 2017 per m<sup>2</sup> :

- ISTERre Grenoble : **102,5 kWh/m<sup>2</sup>**
- ISTERre Chambéry : **41,2 kWh/m<sup>2</sup>**

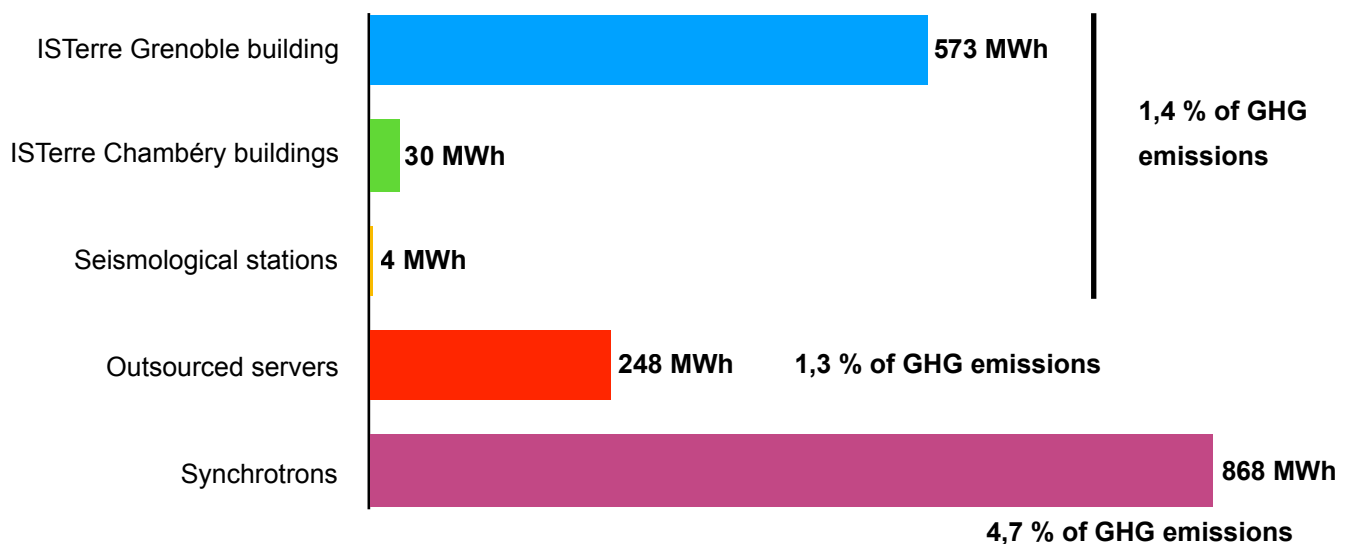
Average French tertiary sector : **131 kWh/m<sup>2</sup>**

Power consumption related with use of synchrotrons and outsourced servers :

Total GHG emissions related with use of synchrotrons : **50 tonnes CO<sub>2</sub>e**

→ Being **5 %** of the ISTERre's GHG emissions

Total GHG emissions related with use of outsourced servers : **14 tonnes CO<sub>2</sub>e**



Power consumption related to ISTERre's activities in synchrotrons is 3 times higher than outsourced servers. However, some researchers anticipated the interruption of ESRF the following years. That's why they made more « shifts » (working session of 8 hours) than during a regular year.

- Power consumption of calculation servers : 240 MWh
- Power consumption of data storage servers (SUMMER) : 8 MWh



### 3. Business travel

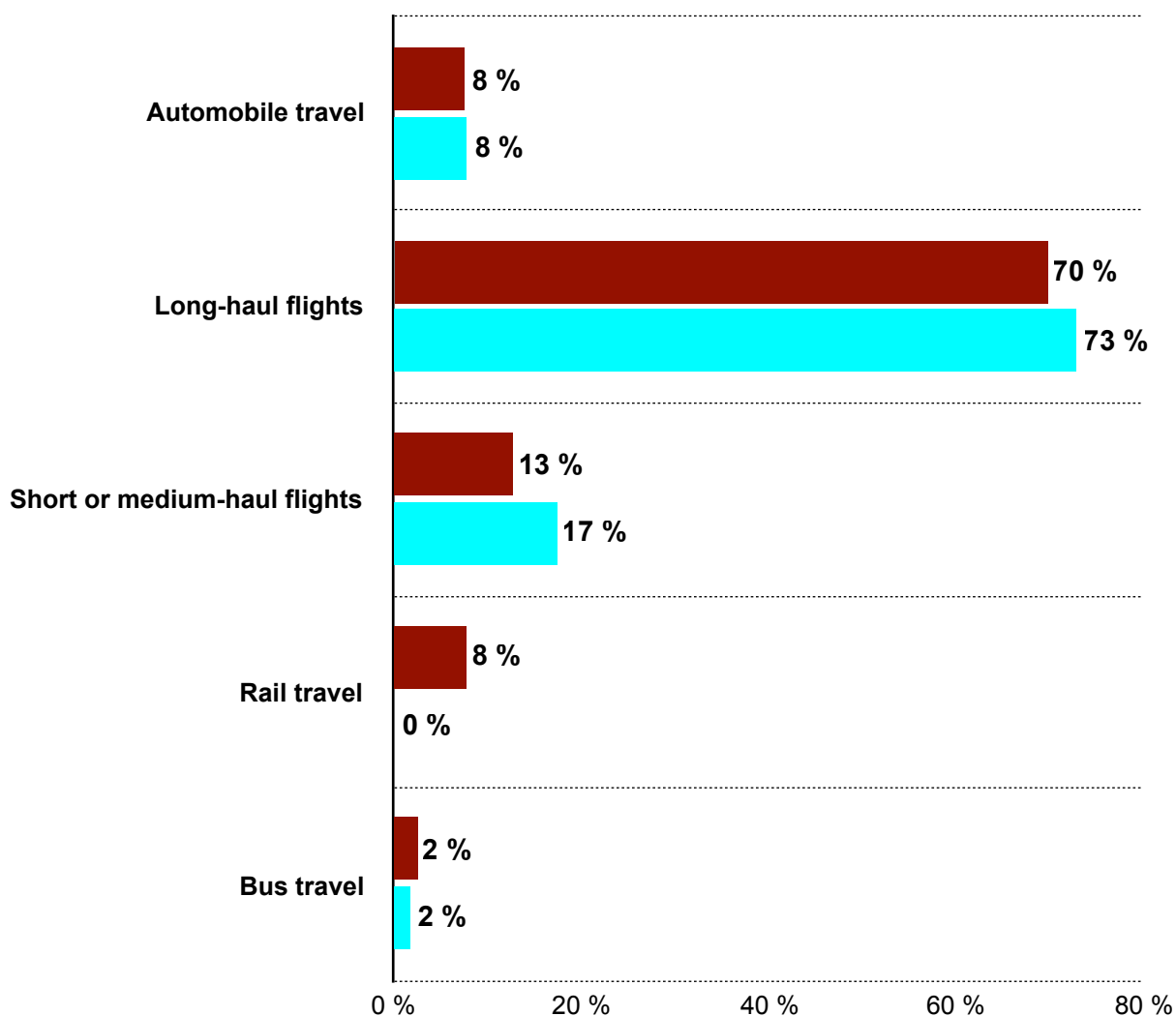
Total GHG émissions related to business travel : **672 tonnes CO<sub>2</sub>e**, being **2,7 tonnes CO<sub>2</sub>e** per agent.

→ Being **63 %** of the ISTERre's GHG emissions

In 2017, ISTERre's staff made more than **1200 business trips** including :

- **195** business trips with **long-haul flights** (more than 2500 kilometers)
- **97** business trips with **short and medium-haul haul flights** (moins de 2500 kilometers)
- **207** travels by train

■ Share of kilometers traveled for each mode of transportation  
■ Share of GHG emissions for each mode of transportation



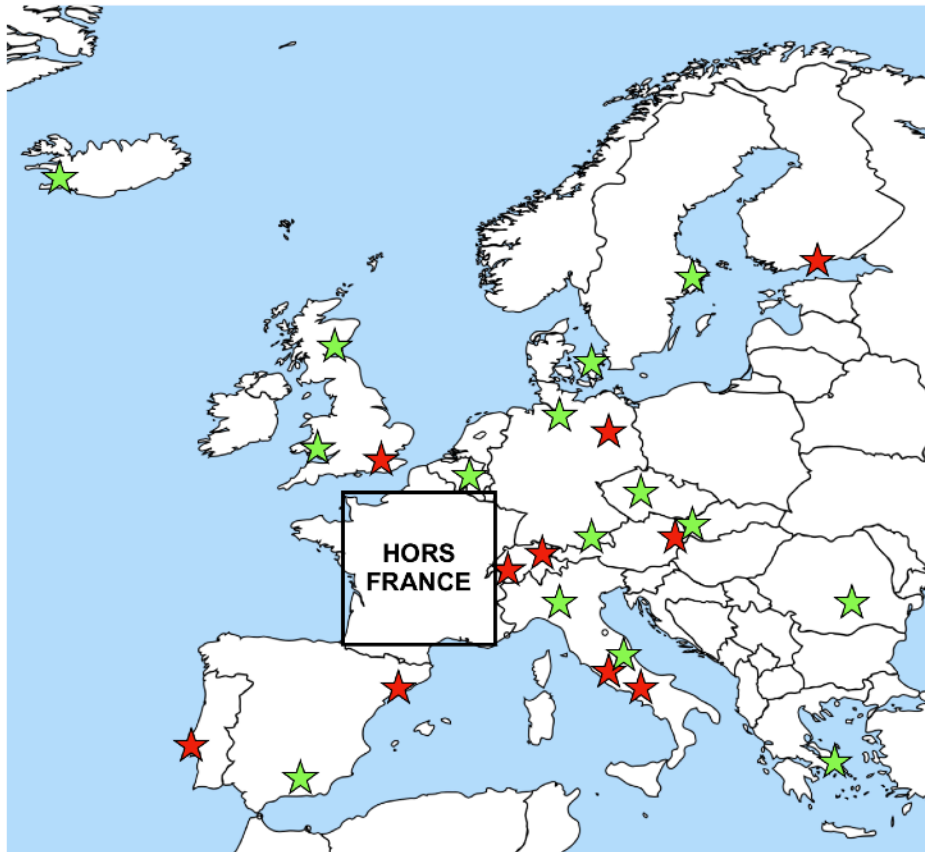
## MOST FREQUENT DESTINATIONS

- 10 most frequent destinations : ★
- Other destinations : ☆

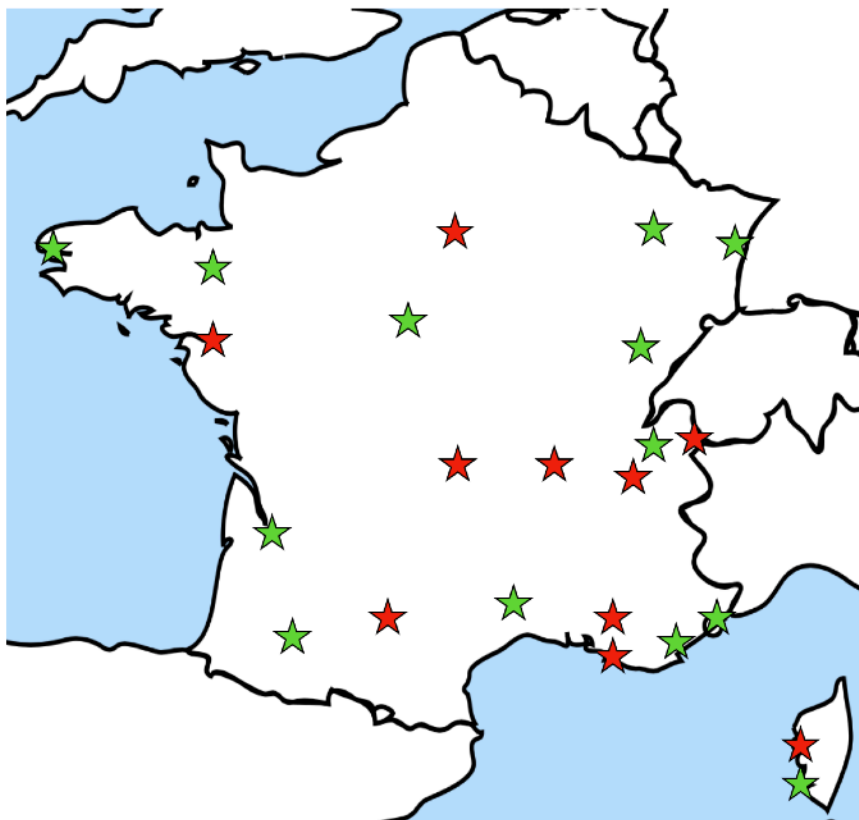
### IN THE WORLD (EXCLUDING EUROPE)



**IN EUROPE (EXCLUDING FRANCE)**



**IN FRANCE (EXCLUDING ISÈRE)**

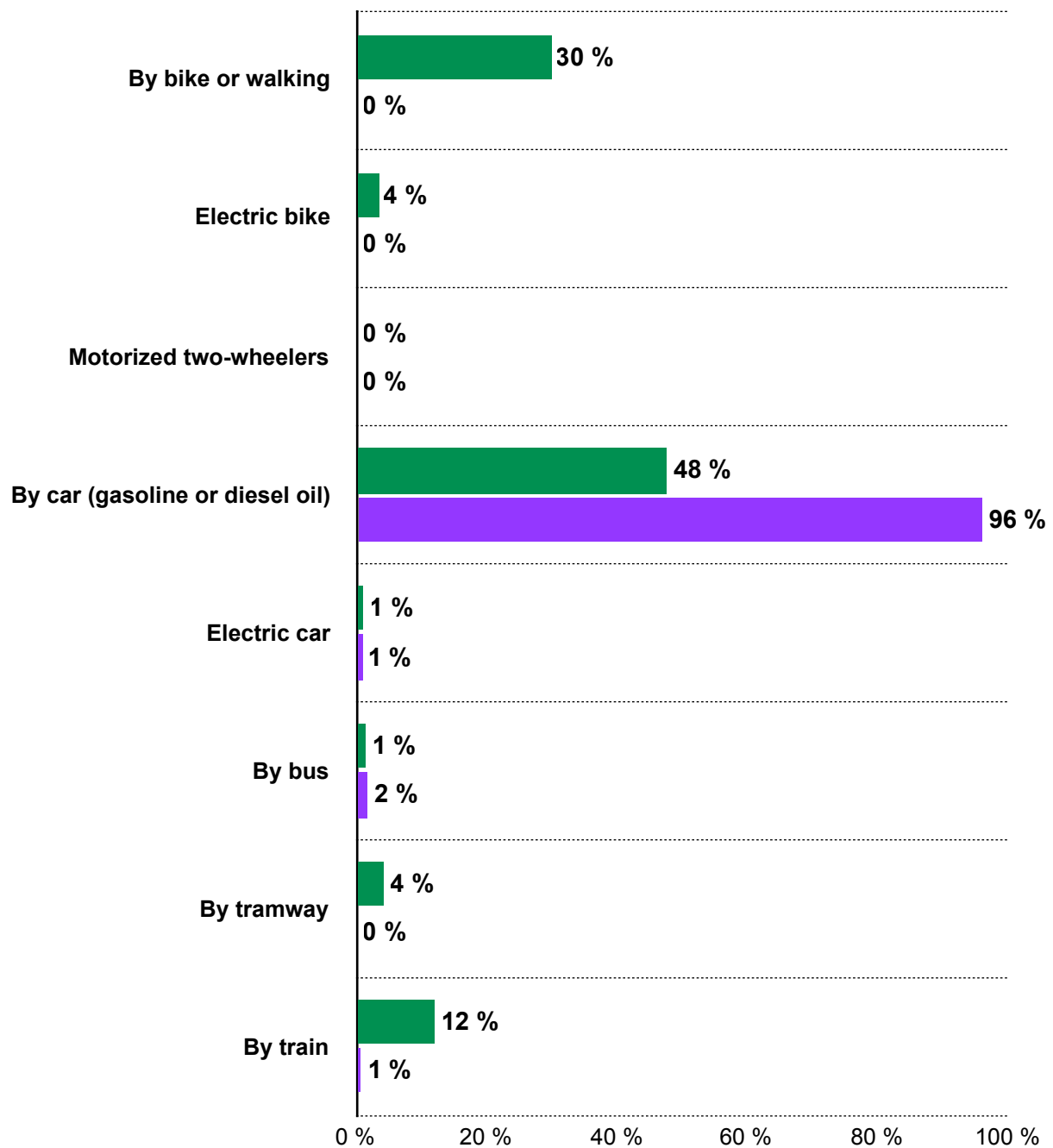


## 4. Employee commuting

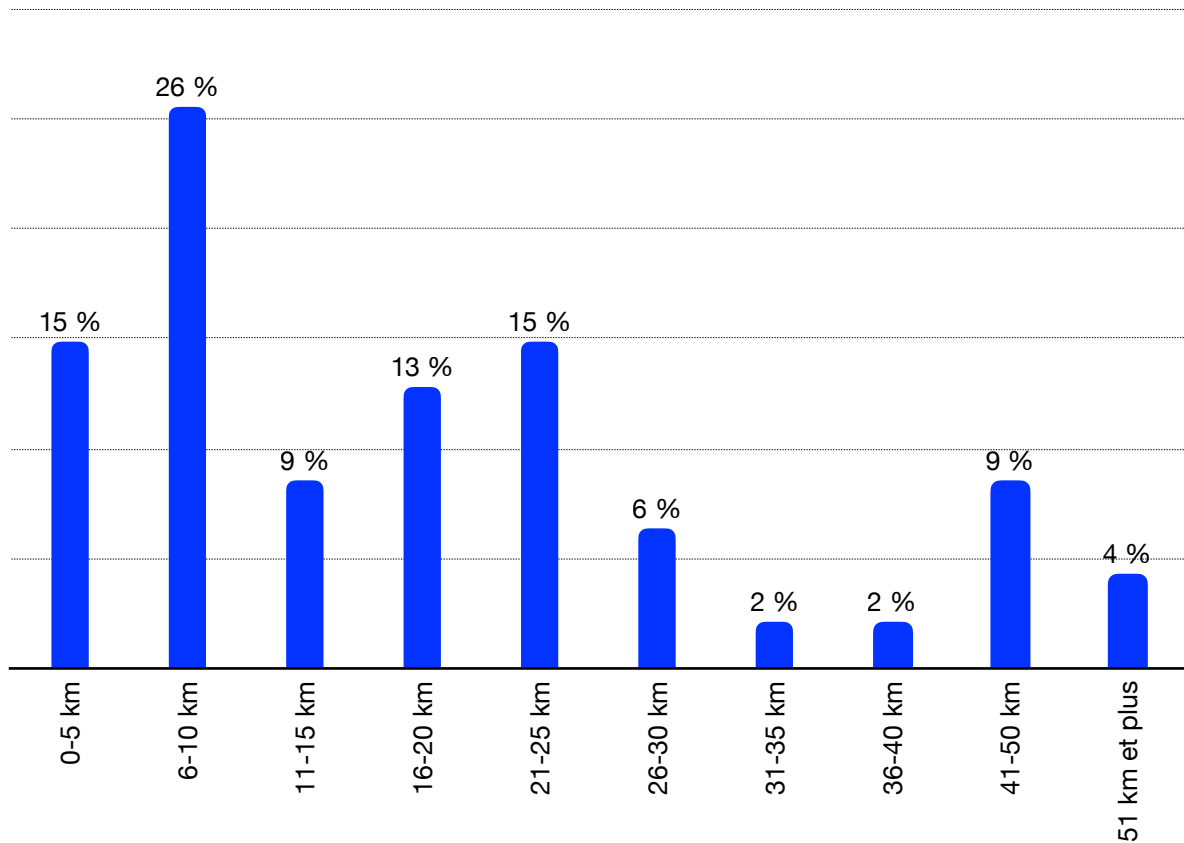
Total GHG émissions related to employee commuting : **164 tonnes CO<sub>2</sub>e**.

→ Being **15 %** of the ISTerre's GHG emissions

■ **Parts des kilomètres parcourus par mode de transport**  
■ **Share of GHG emissions for each mode of transportation**



## Split of commuting trips by car



### Lecture :

- 15 % of commuting by car are journeys less than or equal to 5 kilometers
- Half of commuting (50 %) by car are journeys less than or equal to 15 kilometers

**Carpooling** : 20% of people using a car to travel to ISTerre carpool

### Several modes de transportation used :

22 % of ISTerre's staff use several modes of transportations to go to ISTerre.

Most frequent combinations :

- By bike or walking - By car - By train
- By bike or walking - By tramway
- By bike or walking - By car

## II. PROPOSALS FOR ACTIONS

### **Business travels :**

- Facilitate videoconferencing
- Buy an electric vehicle (bike or car) by the laboratory
- Use train over plane for trips in France
- Allow carpooling in business trips

### **Employee commuting :**

- Promote travels by bike or electric bikes
- Facilitate teleworking
- Promote carsharing and carpooling

### **Synchrotrons :**

- Optimiser l'utilisation du temps de faisceau
- Promote data sharing

### **Outsourced servers :**

- Develop different backup levels depending on the type of data
- Add an expiry metadata to determine when the data should be deleted
- Organize every year a cleaning of the data considered useless

### **Natural gas :**

- Best adaptation of the start and stop dates of the heating
- Install thermostats to adapt offices temperatures
- Improve the insulation of buildings

### **Power consumption :**

- Turn off computers and screens when the agent is not present at ISTerre (except for reason to leave his computer on)
- Relocate servers located in ISTerre in a more efficient server room

### **IT infrastructure :**

- Do not change his equipment as long as it is working
- Take the 5 years warranty for equipments (7 years for servers)

### **Air-conditioning units :**

- Replace older air conditioners with newer ones