

## **Labos 1point5 research group**

Reducing the environmental footprint of our  
research activities



Marion Avet (iEES, INRAE) - Labos 1point5 research group project manager

[www.labos1point5.org](http://www.labos1point5.org)

## Different questions

- *Labos 1point5*: a research group?
- Carbon footprint: how to measure it?
- Carbon footprint of research activities
- How to act?

## Labos 1point5 research group

- Created from a collective in 2019
- To understand and reduce the carbon footprint of research activities
- To initiate institutional and cultural transformation

### 1 coordinating team

Tamara Ben Ari (INRAE) - Director  
Olivier Aumont (IRD)  
Guillaume Blanc (Université de Paris)  
Odile Blanchard (Université Grenoble-Alpes)  
André Estevez-Torres (CNRS)  
Marie-Alice Foujols (CNRS)  
Patrick Hennebelle (CEA)  
Jérôme Mariette (INRAE)  
Céline Serrano (INRIA)  
Marion Avet (INRAE) - Project manager

### 4 project teams

### 1 scientific council

Valérie Masson Delmotte (IPSL/GIEC/HCC)  
Philippe Quirion (CNRS)  
Quentin Perrier (HCC)  
Catherine Bourgain (INSERM)  
Hervé Lefebvre (ADEME)



### Fundings



# Objectives and organization

<https://labos1point5.org>



The screenshot shows the homepage of the Labos 1point5 website. The header includes the logo, navigation links (Collectif, Vidéos, Outils, Ressources, Actualités), and a menu icon. The main heading is 'Reducing the environmental footprint of our research activities'. Below this is a paragraph describing the organization as an international, cross-disciplinary collective of academic researchers. The page is divided into three main sections: 'GES 1POINTS', 'THE COLLECTIVE', and 'FOLLOW US'. The 'GES 1POINTS' section describes a national scientific study on the carbon footprint of French public research. The 'THE COLLECTIVE' section describes the collective of members and provides participation information. The 'FOLLOW US' section includes a newsletter subscription form with an email input field and a 'Send' button. A table at the bottom of the 'THE COLLECTIVE' section shows membership statistics.

## Labos 1point5

Collectif Vidéos Outils Ressources Actualités

### Reducing the environmental footprint of our research activities

Labos 1point5 is an international, cross-disciplinary collective of academic researchers who share a common goal: to better understand and reduce the environmental impact of research, especially on the Earth's climate.

#### GES 1POINTS

Labos 1point5 launches a national scientific study on the **carbon footprint** of the **French public research** to provide food for thought on the levers of action to reduce its impact on the climate and the environment.

**Why use GES 1point5?** The answer in **5 points**.

#GHG INVENTORIES	#LABORATORIES	#INITIATIVES
-	-	-

#### THE COLLECTIVE

Labos 1point5 is a collective of members of the academic world whose activities are organized within a **research group** and a **think tank**. To participate in the collective's activities, you can **join the GDR** and the **think tank**. Subscribers follow the collective's activities with the newsletter.

#RG MEMBERS	#THINK TANK MEMBERS	#SUBSCRIBERS
251	497	4000

#### FOLLOW US

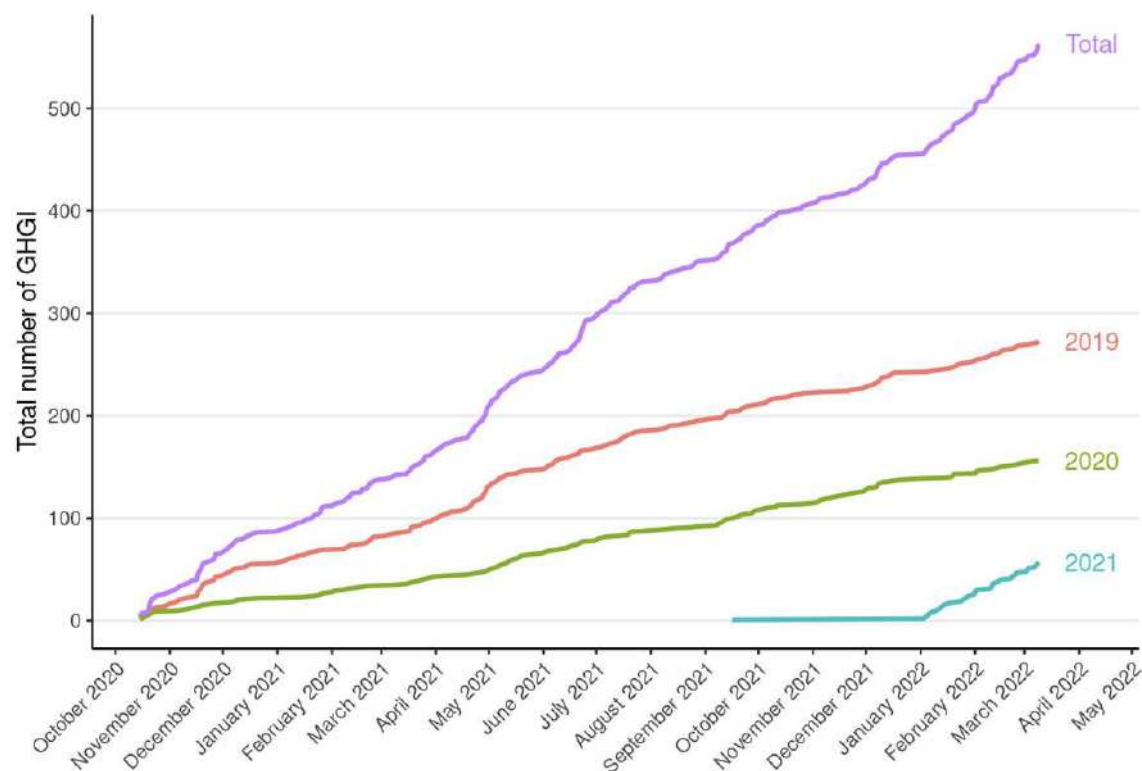
Subscribe to our **newsletter**. This does not commit you to anything, but allows you to stay informed of the various activities of the collective.

**Email \***

Send

### Carbon team

- Analysis of the carbon footprint of research activities in France using the *GES 1point5* tool
- Evolution of the number of annual greenhouses gas (GHG) inventories started in *GES 1point5* for 2019, 2020 and 2021





### Transition team

- Supporting the transition in research laboratories
- Evaluate the effects of changes in practice on GHG emissions

- GHG inventory

- 
- GHG emissions reduction tools
  - Laboratories in transition network

# Carbon footprint: how to measure it?

## *Reminders*



<https://labos1point5.org/ges-1point5>

## Carbon footprint

- 1 indicator to measure the quantity of GHG released into the atmosphere by 1 activity

## Different methods

- From physical flows
- From cash flows

## Different tools

- GHG Protocol (scope 1, scope 2, scope 3)
- Bilan Carbone©
- Regulatory GHG inventory (scope 1 and 2 of the GHG Protocol)

## Different emission factors for 1 emission source

- Different emission factors depending on the country
- Different emission factors depending on the scope\*

*\*The fuel example: combustion or production and combustion?*



# How to measure greenhouse gas emissions?



## State of play



- 1 need for harmonization (scope, method and emission factors)
- 0 standardized tool for research activities

## 1 GES 1point5 tool

- 1 free & online tool to carry out the GHG inventory of laboratories
- 1 methodology


## 6 emissions categories


- Buildings
- Purchases
- Digital devices
- Vehicles
- Business travels
- Commutes


GES 1 POINT 5


[Collectif](#) [Vidéos](#) [Outils](#) [Ressources](#) [Actualités](#) [Profil](#) [FR](#) [EN](#)

LA DOCUMENTATION


 La méthodologie ▲


 Aide ▲


 Protection des données


 L'équipe GES 1point5 ▲


LES DONNÉES


 Introduction


 Le périmètre


 Les bâtiments


 Les Achats Accès anticipé

 Matériel informatique

 Les véhicules

 Les missions

 Dpts domicile / travail


 **Introduction**

*GES 1point5*, développé par *Labos 1point5*, est un outil permettant de calculer l'empreinte carbone et de construire le bilan gaz à effet de serre (BGES) réglementaire de votre laboratoire.

A travers cet outil l'objectif est double :

- Mener des études scientifiques relatives à l'empreinte carbone de la recherche publique française (notre champ d'investigation actuel est limité à la France, y compris les DOM-TOM).
- Nourrir la réflexion sur les leviers d'actions permettant de réduire l'impact des activités de recherche sur les émissions de gaz à effet de serre, tant à l'échelle nationale que locale au laboratoire.

Merci de bien vouloir **consulter attentivement la documentation** (méthodologie et aide) avant de débiter et de nous contacter.

 **How to cite**

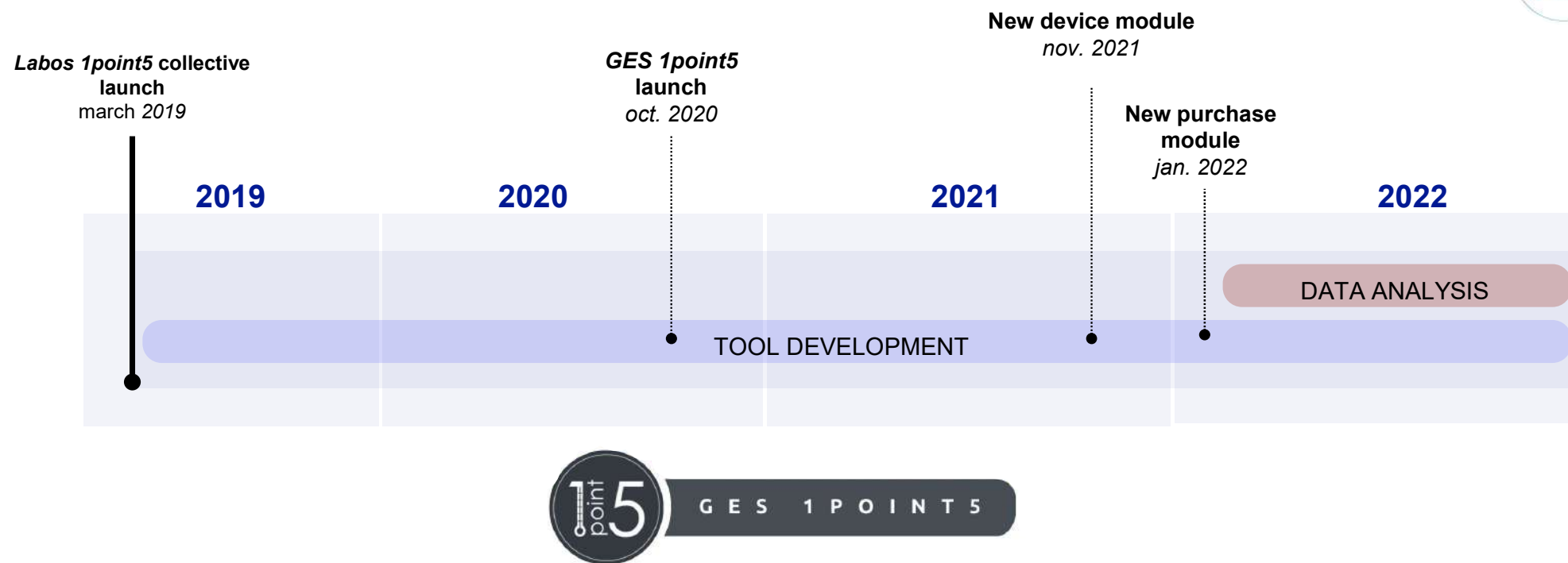
*An open-source tool to assess the carbon footprint of research.* Jérôme Mariette, Odile Blanchard, Olivier Berné, Olivier Aumont, Julian Carrey, AnneLaure Ligozat, Emmanuel Lellouch, Philippe-Emmanuel Roche, Gaël Guennebaud, Joel Thanwerdas, Philippe Bardou, Gérald Salin, Elise Maigne, Sophie Servan and Tamara Ben-Ari. 2022 Environ. Res.: Infrastruct. Sustain. **2** 0350080 10.1088/2634-4505/ac84a4 .

# Carbon footprint of research activities

## *First results*



<https://labos1point5.org/ges-1point5>



## GES 1point5

- 3 years of data collection
- 1 national database
- 104 GHG inventories submitted for 2019

### Average GHG emissions for the year 2019\*

- 695 tons of eCO<sub>2</sub> per research laboratory
- 5.3 tons of eCO<sub>2</sub> per person
- 1 million tons for research activities in France

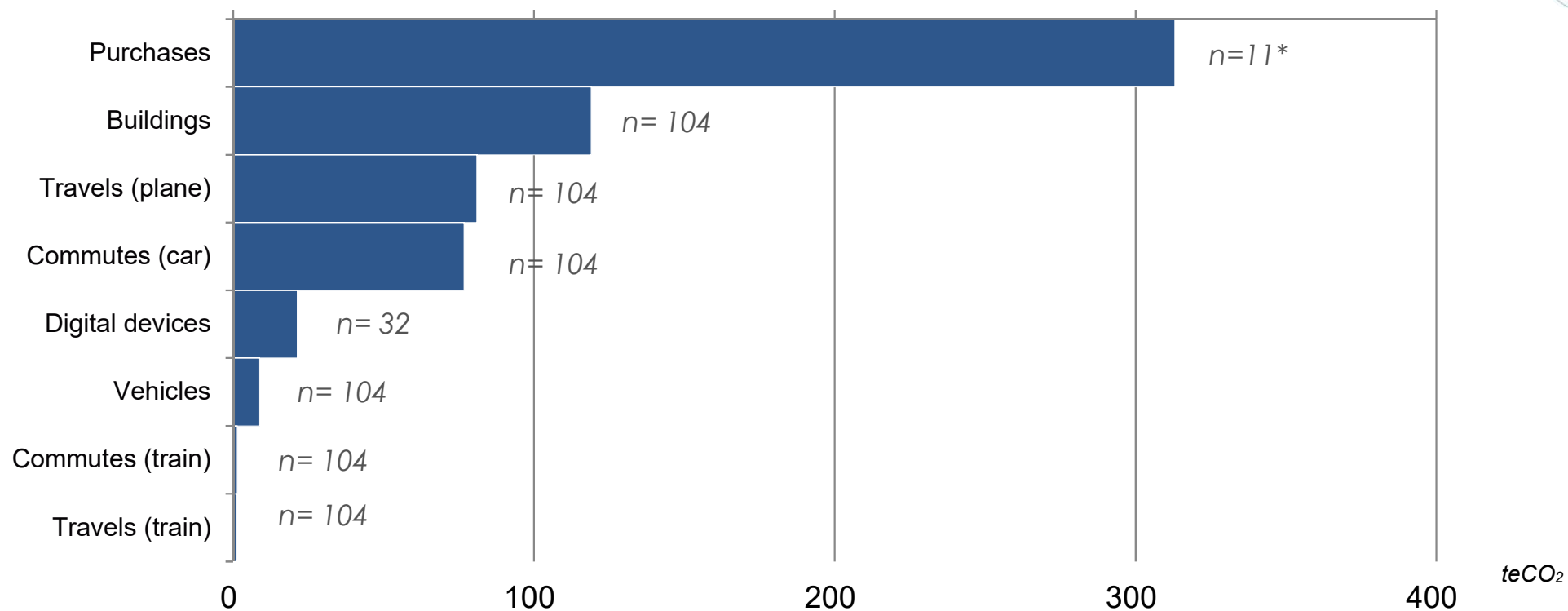
### GHG emissions targeted for carbon neutrality in 2050

- 2 tons eCO<sub>2</sub> per person

\*Résultats not stabilized



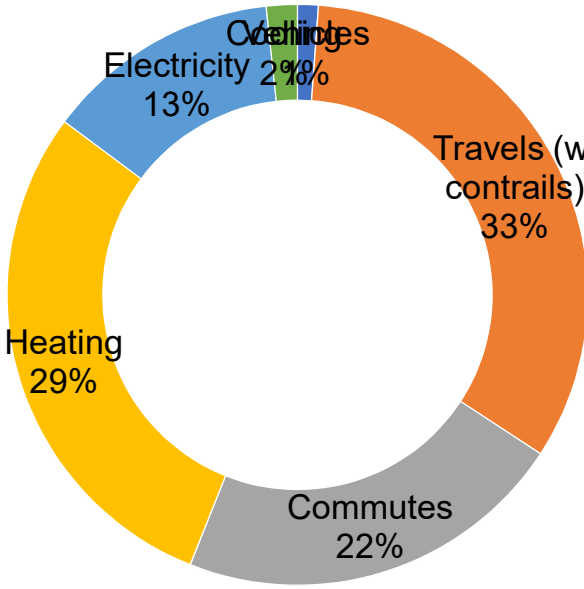
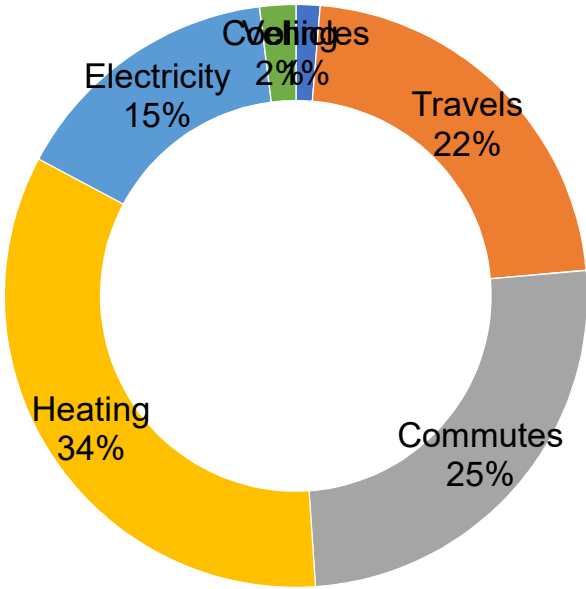
## First results



## In detail

- Average eCO<sub>2</sub> emissions by category (normalized by laboratory)

*\*n the number of laboratories taken into account*

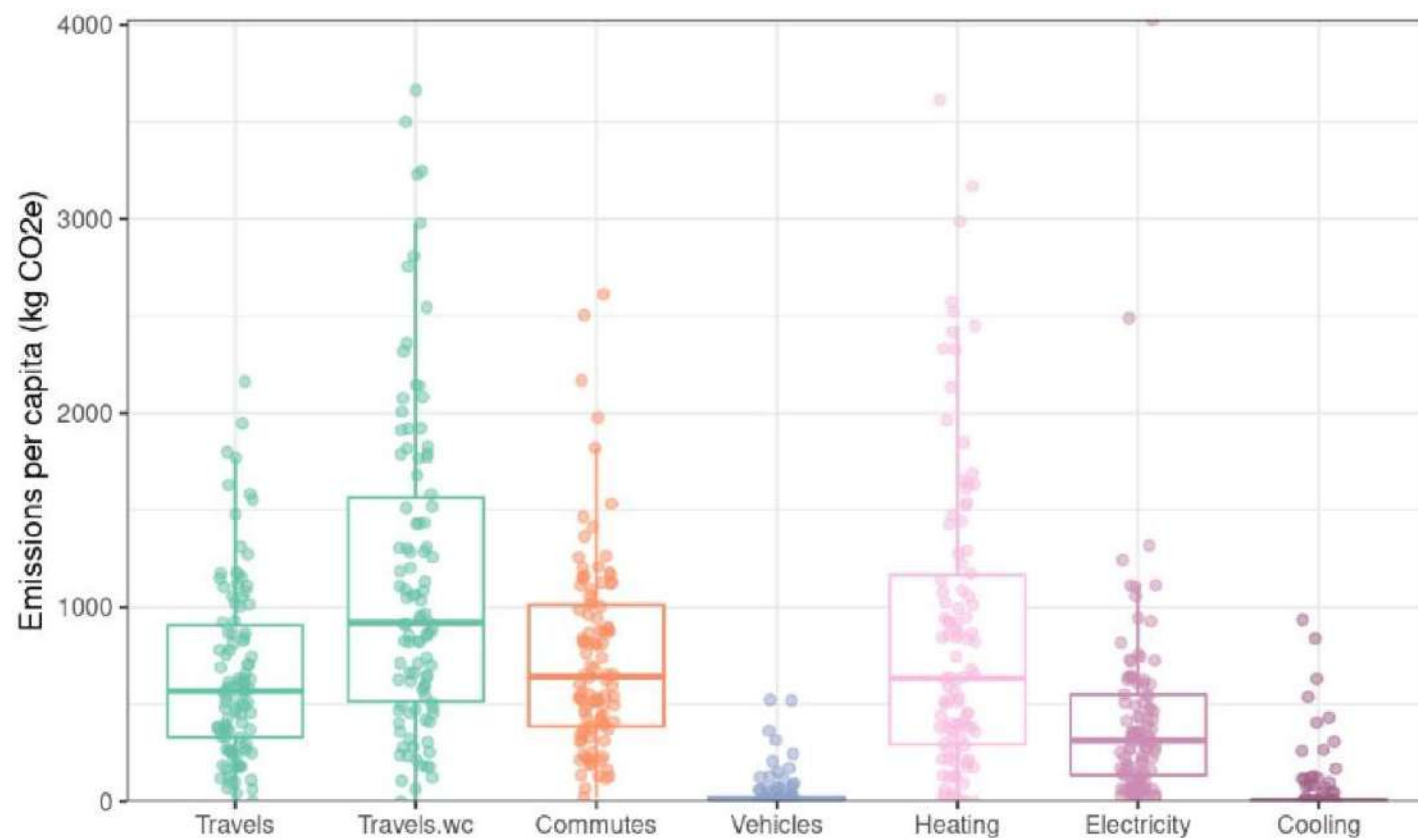


In detail

- Breakdown of eCO<sub>2</sub> emissions by category\* (with and without contrails)

*\*Purchases module not taken into account*

## First results



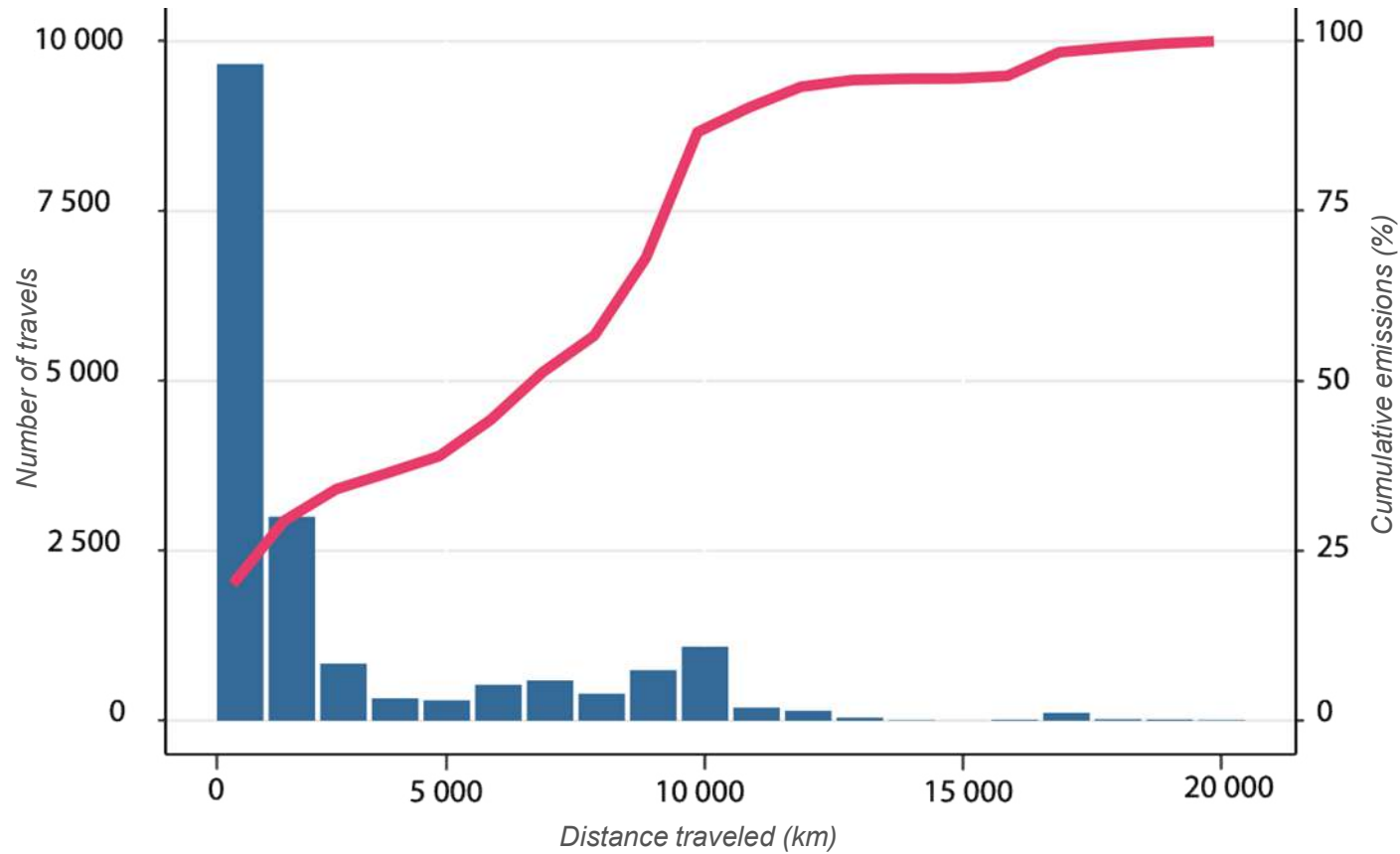
- For each category, 1 point represents 1 laboratory
- Heterogeneity between laboratories (size of the laboratory, budget, etc.)

## In detail

- GHG emissions by category (normalized by laboratory)

*\*Purchase module not taken into account*

## Travels

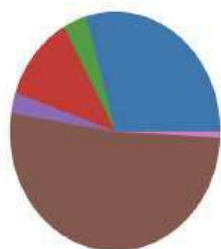


- Emissions from medium and long-haul air travels
- Scientific visibility issue (travels and publications)
- Inequalities between people and laboratories issues

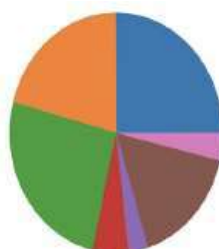
- Distances traveled and cumulative GHG emissions

## Travels

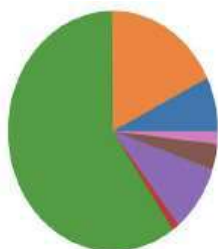
- GHG emissions by purchase category



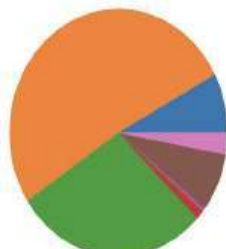
Social studies



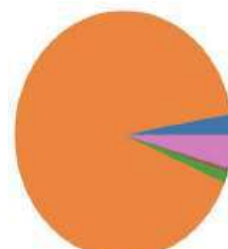
Geosciences



Physics



Chemistry & biology



Analysis platform



- Different categories of purchases identified
- Different distributions of emissions according to the laboratories



## Key points

- A significant share of emissions *a priori* (from 20 to 40%)
- Great variability between laboratories (in the emission factors of purchases & in the breakdown of emissions)

## Why such an impact?

- Research is a tertiary activity (purchase of goods and services necessary to fulfill its objectives)
- Manufacturing goods has a high carbon footprint

## After

- Difficult reduction strategies

# How to act?

## *Transition tools*



<https://labos1point5.org/ges-1point5>

### How to act?

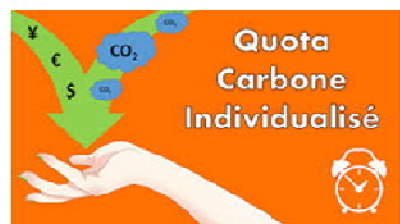
- Carry out the GHG inventory of the laboratory
- Put in place emission reduction tools
- Communicate

### On which level?

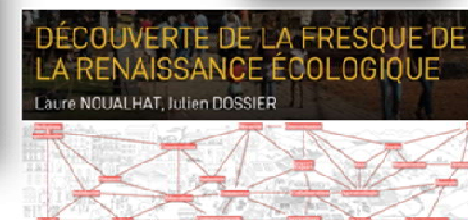
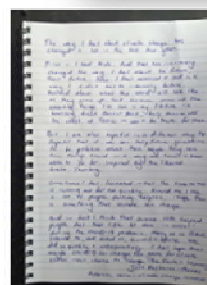
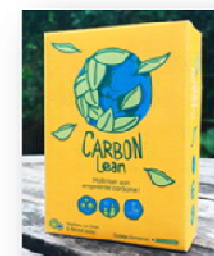
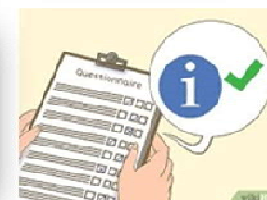
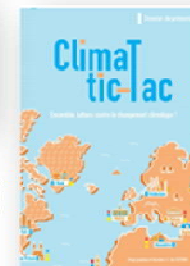
- At the individual level
- At the laboratory level
- At the supervisory level

## Reduction tools

- Awareness tools
- Regulatory & financial tools



Euro vert



CHARTRE VERTE

# Greenhouse gas inventory

*GES 1point5*



<https://labos1point5.org/ges-1point5>



# Greenhouse gas inventory steps



## Data collection

- Boundaries
- Buildings
- Purchases
- Digital devices
- Vehicles
- Business travels
- Commutes

## Data processing

- Formatting data

## After

- Present the results to the laboratory
- Initiate a reflection on the actions to be implemented to reduce GHG emissions

## Communication

- Mobilize the entire laboratory and present the approach
- Have the agreement and support of the unit direction
- Have time

## Point of attention

- Difficulties accessing data



At the end

- Illustration of the annual carbon footprint of a fictitious laboratory in *GES 1point5*\*

CARBON FOOTPRINT OF THE LABORATORY

108.83 ± 34.15 t CO<sub>2</sub>e

CARBON FOOTPRINT PER CAPITA

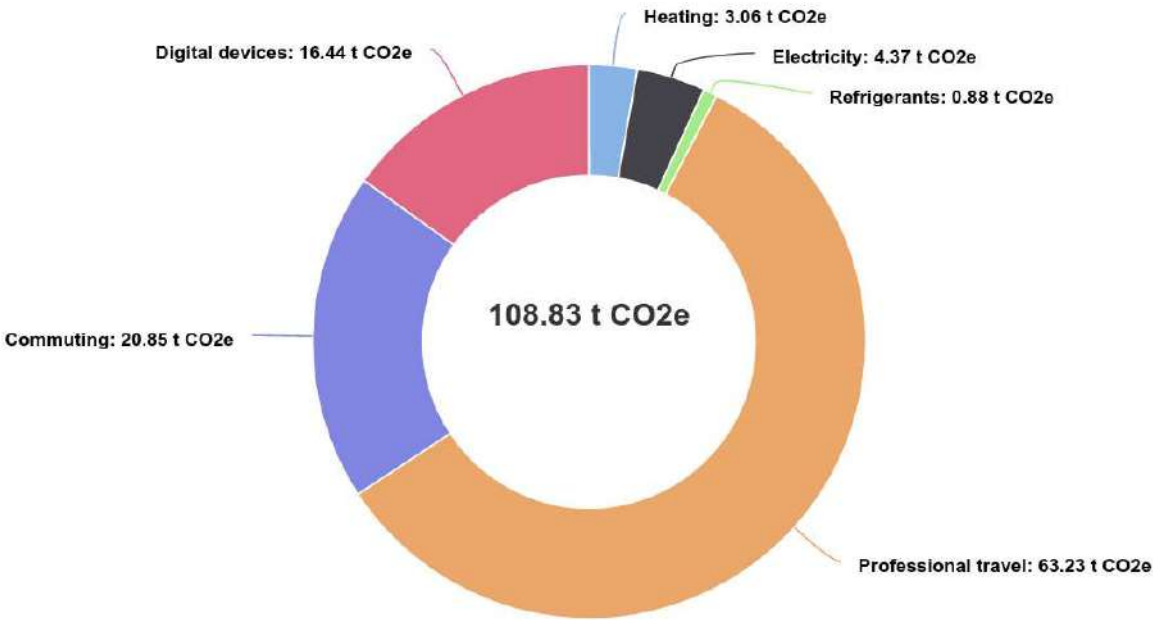
1 379 ± 431 kg CO<sub>2</sub>e

CARBON INTENSITY

124 ± 39 g CO<sub>2</sub>e / €

The results provided by GES 1point5 are based on the French regulation that advocates, for aviation emissions, to take into account the emissions linked to fuel combustion, and to exclude emissions from condensation trails. The radiative forcing of these contrails is significant even if its magnitude is still uncertain. Therefore, GES 1point5 also displays for information, the **total carbon footprint of the laboratory including contrails** in the emissions from air travel: **154.95 ± 99.68 t CO<sub>2</sub>e**.

Carbon footprint	Emissions in t CO <sub>2</sub> e	Share of the total footprint	
Carbon footprint of buildings	8.31 ± 1.62	8 %	<div><div></div><div>Submit</div></div>
-- Heating	3.06 ± 0.92	3 %	
-- Electricity	4.37 ± 0.44	4 %	
-- Refrigerants	0.88 ± 0.26	1 %	
Carbon footprint of digital devices	16.44 ± 9.85	15 %	<div><div></div><div>Submit</div></div>
Carbon footprint of travels	84.07 ± 22.68	77 %	
-- Commuting	20.85 ± 12.47	19 %	<div><div></div><div>Submit</div></div>
-- Professional travel	63.23 ± 10.22	58 %	<div><div></div></div>
-- Vehicles	2.76 ± 1.66	3 %	<div><div></div><div>Submit</div></div>
-- Business travel	60.47 ± 8.56	56 %	<div><div></div><div>Submit</div></div>
Total carbon footprint	108.83 ± 34.16	100 %	<div><div></div><div>Submit</div></div>



\*An open-source tool to assess the carbon footprint of research. Jérôme Mariette, Odile Blanchard, Olivier Berné, Tamara Ben-Ari. bioRxiv 2022.

## Join the research group

- <https://labos1point5.org/rejoindre-gdr>

## GES 1point5

- 1 online tool <https://labos1point5.org/ges-1point5>
- 1 online user guide & 2 online tutorials
- 3 online simulators (commutes, travels and purchases)

## Other resources

- 1 online seminar <https://labos1point5.org/les-seminaires>
- Decypherings of scientific publications  
<https://labos1point5.org/les-decryptages>
- 1 twitter account <https://twitter.com/labos1point5>



**Labos 1point5 research group**

Thank you for your attention



[www.labos1point5.org](http://www.labos1point5.org)