Labos 1point5 research group

Reducing the environmental footprint of our research activities

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www.labos1point5.org

Different questions

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

A research group

***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

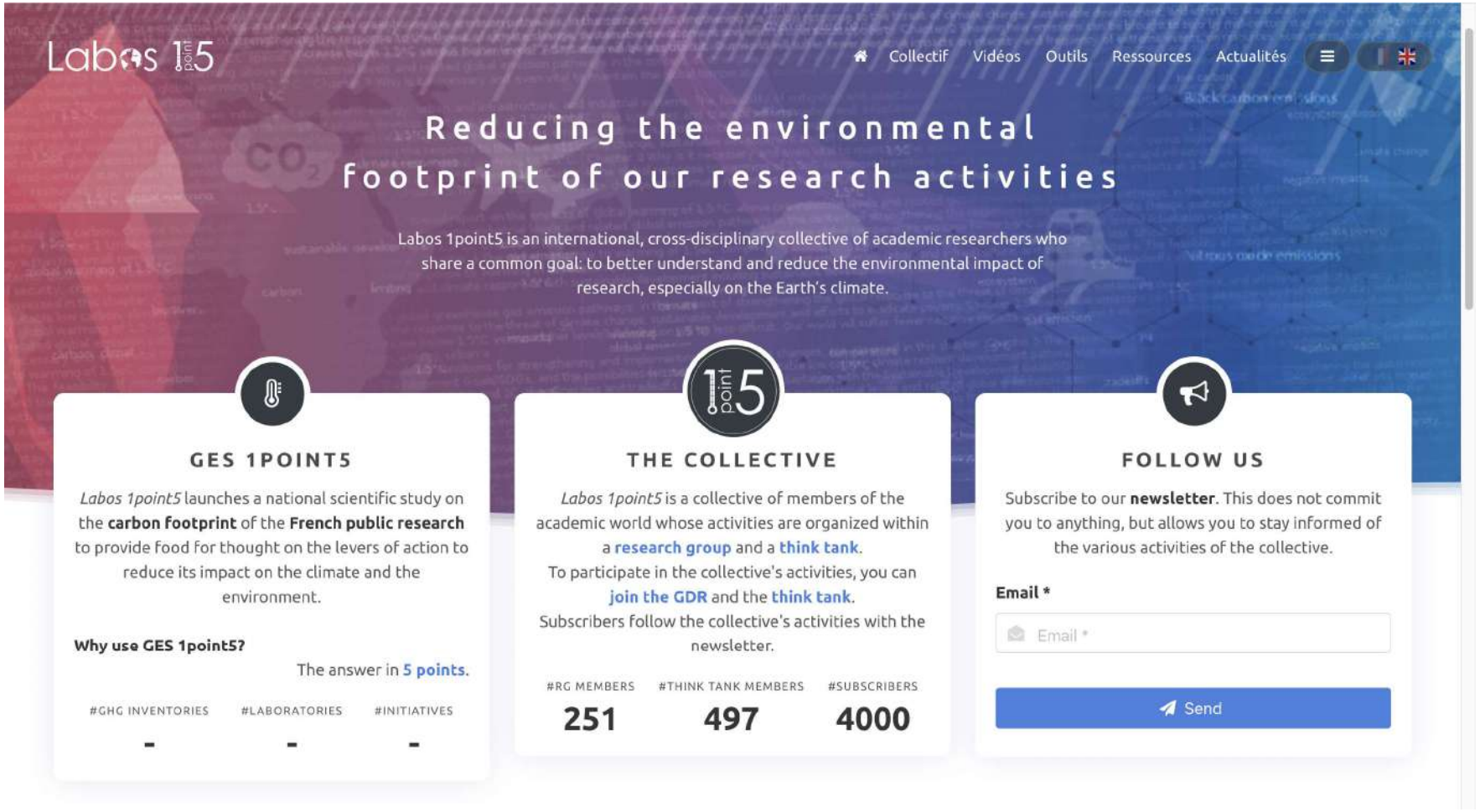
1 scientific council

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

Fundings

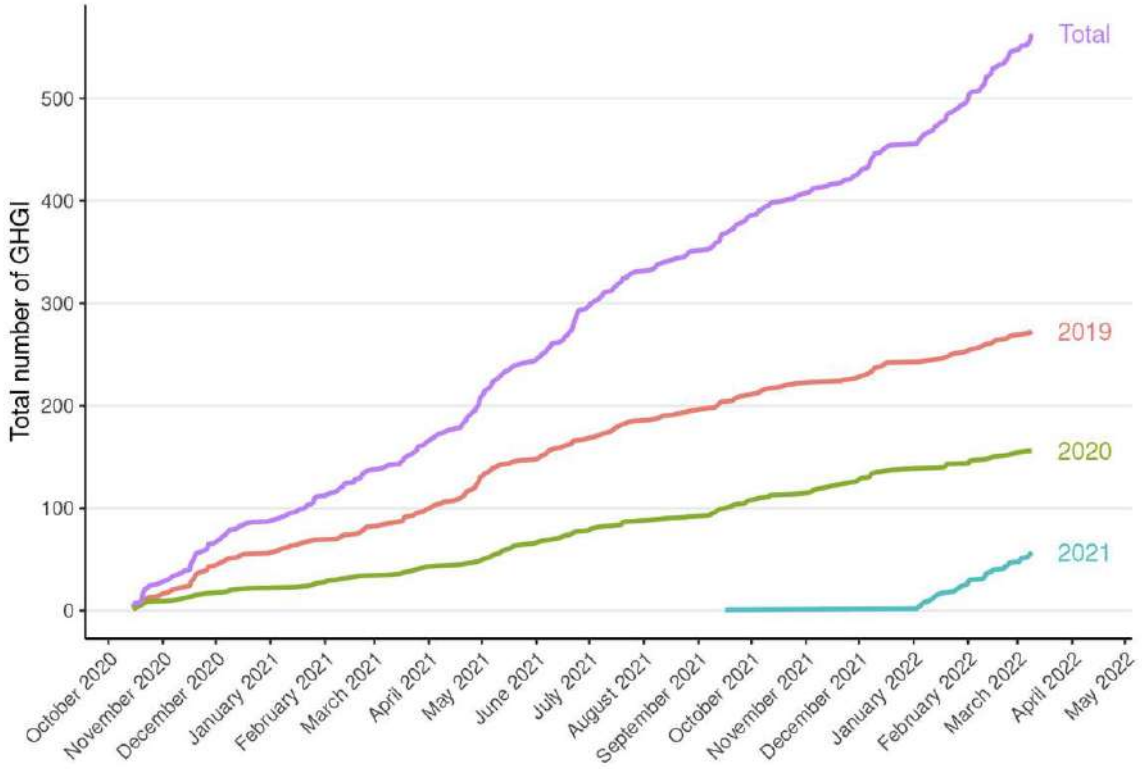
Objectives and organization

https://labos1point5.org



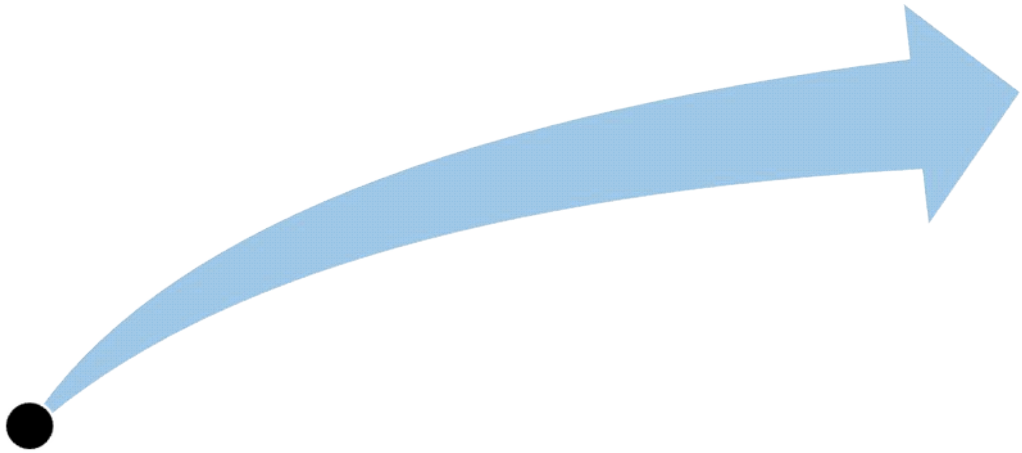
Carbon team

- 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

How to measure greenhouse gas emissions?

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

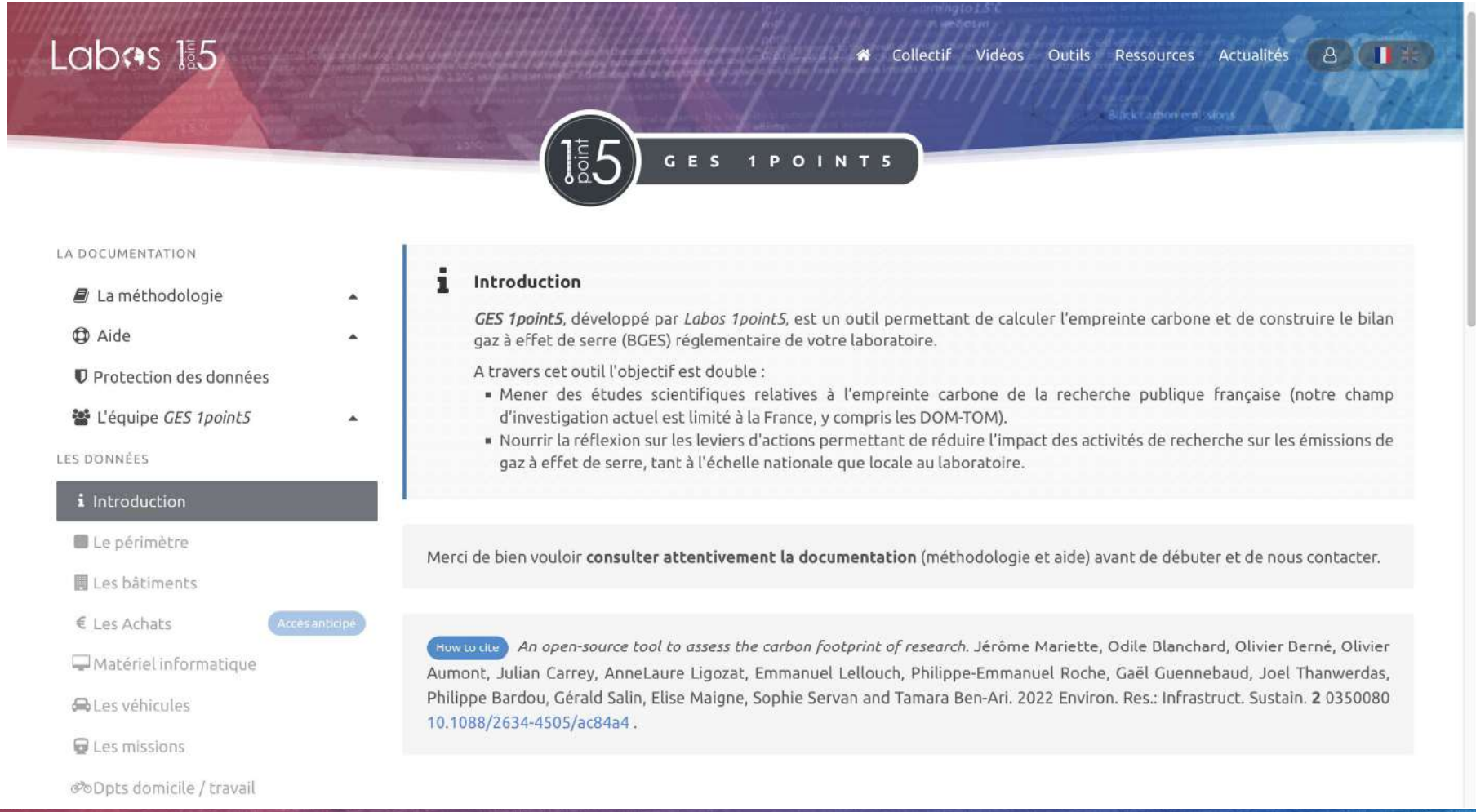
- 1 free & online tool to carry out the GHG inventory of laboratories
- 1 methodology

6 emissions categories

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

GES 1point5

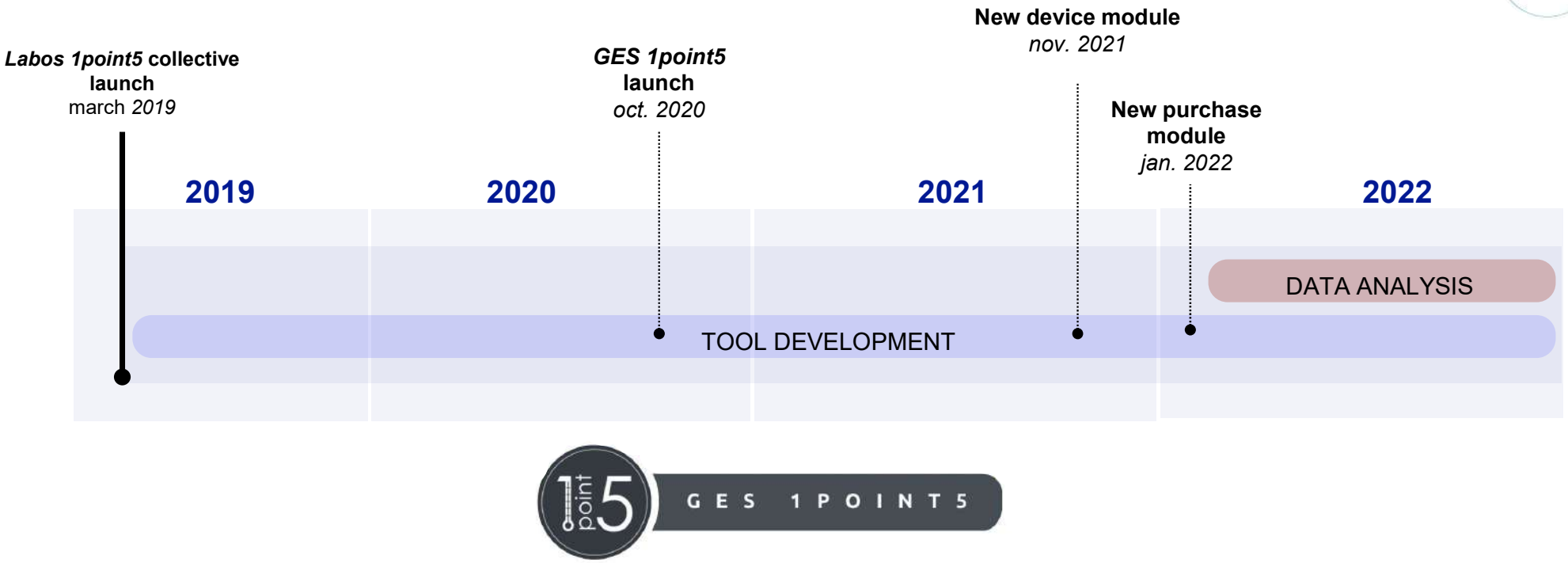
https://labos1point5.org/ges-1point5



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

First results

Average GHG emissions for the year 2019*

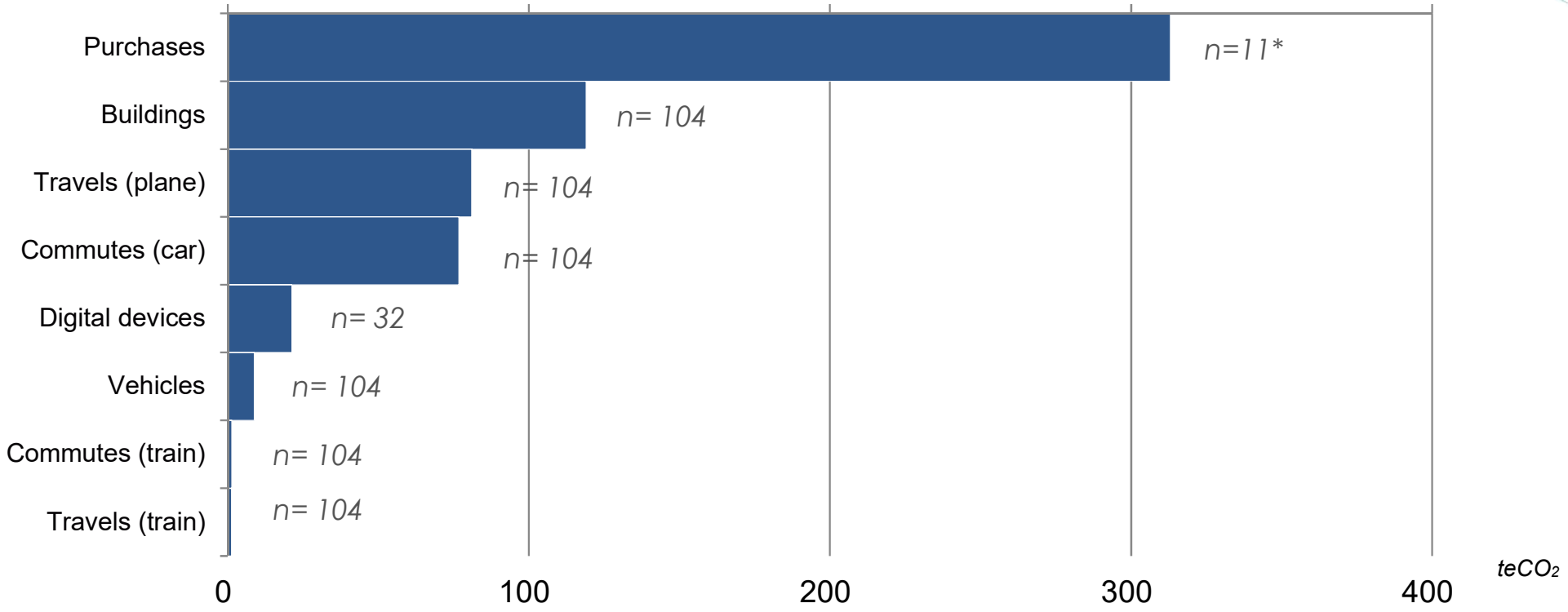
- 695 tons of eCO_2 per research laboratory
- 5.3 tons of eCO_2 per person
- 1 million tons for research activities in France

GHG emissions targeted for carbon neutrality in 2050

- 2 tons eCO_2 per person

**Résultats not stabilized*

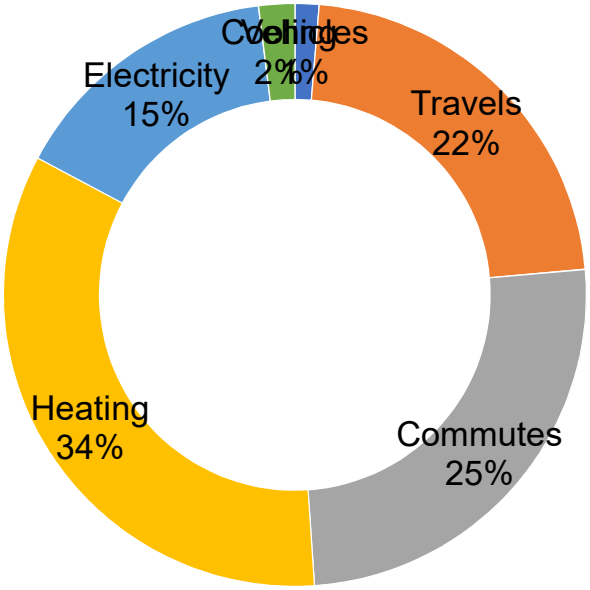
First results

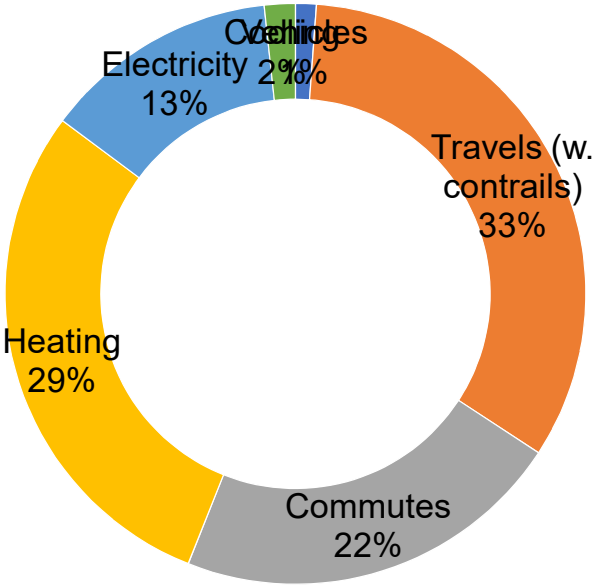


In detail

- Average eCO_2 emissions by category (normalized by laboratory)

**n the number of laboratories taken into account*



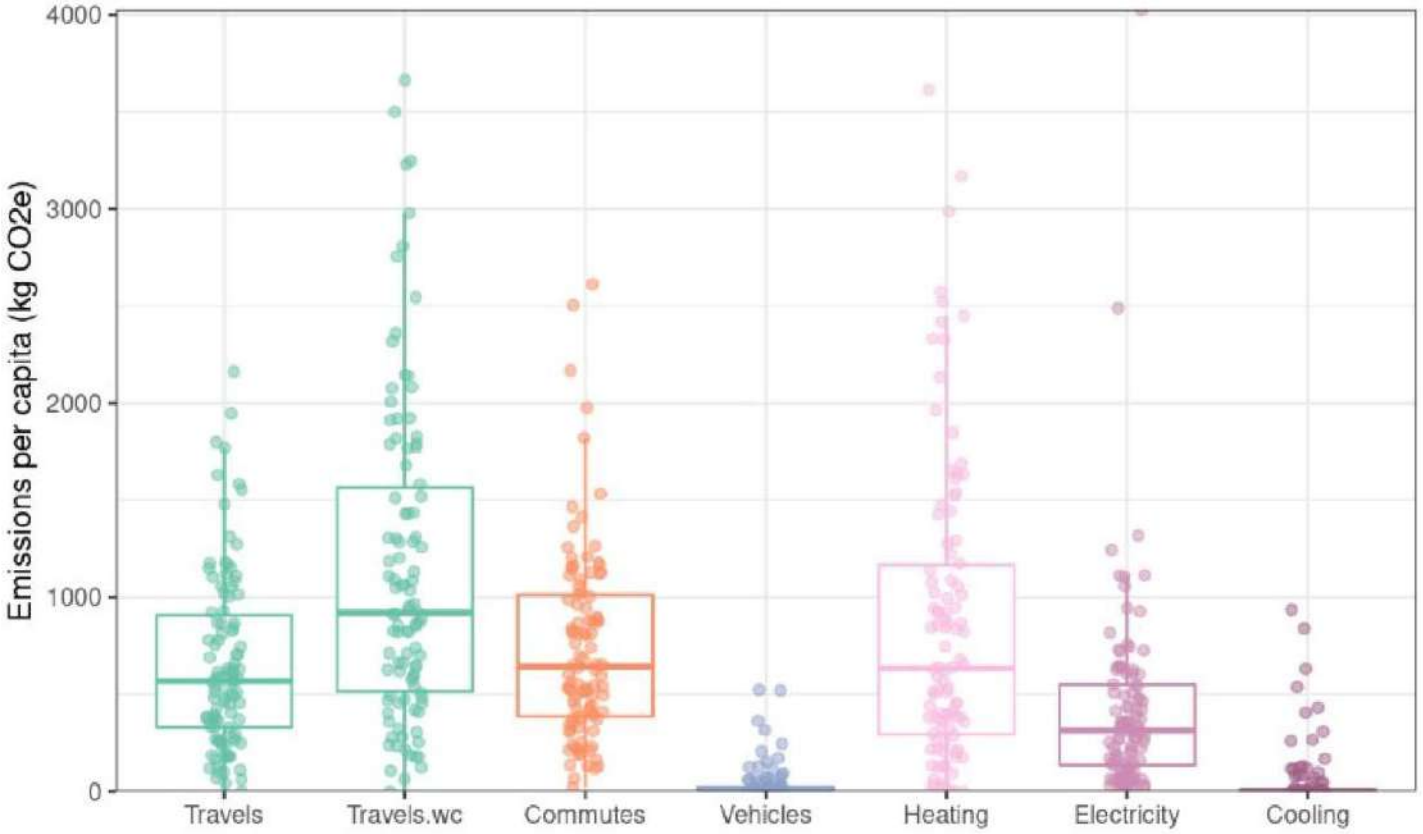


In detail

- Breakdown of eCO_2 emissions by category* (with and without contrails)

**Purchases module not taken into account*

First results

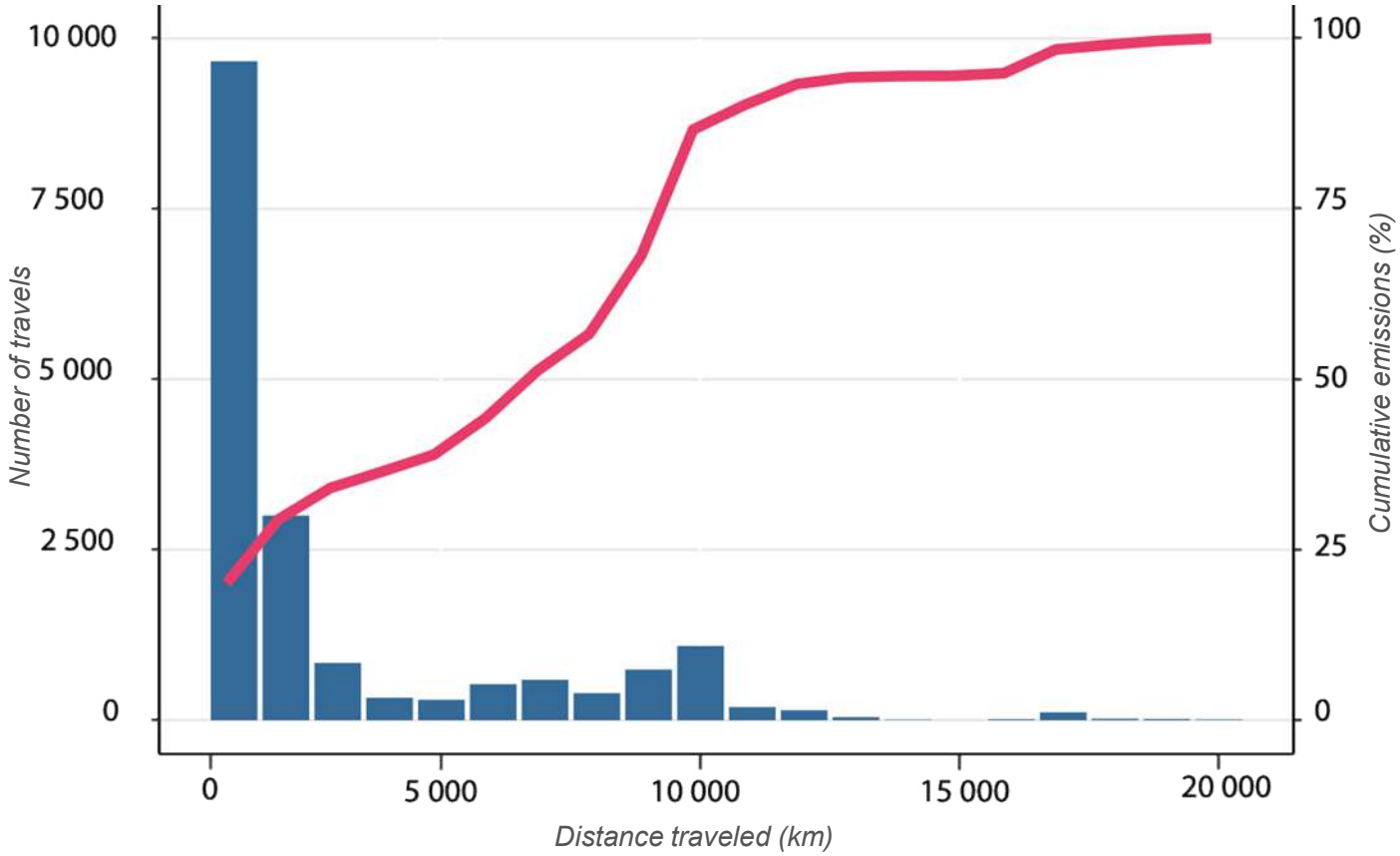


- For each category, 1 point represents 1 laboratory
- Heterogeneity between laboratories (size of the laboratory, budget, etc.)

In detail

- GHG emissions by category (normalized by laboratory)

**Purchase module not taken into account*



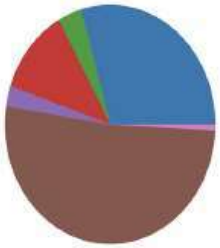
- Emissions from medium and long-haul air travels
- Scientific visibility issue (travels and publications)
- Inequalities between people and laboratories issues

Travels

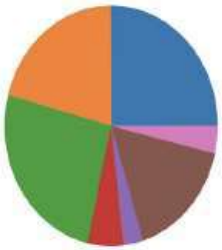
- Distances traveled and cumulative GHG emissions

Purchases

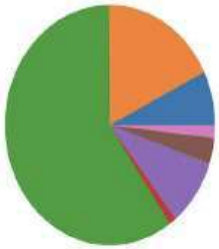
- GHG emissions by purchase category



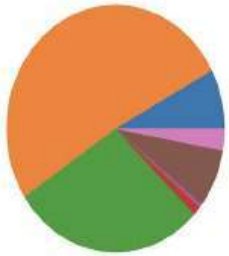
Social studies



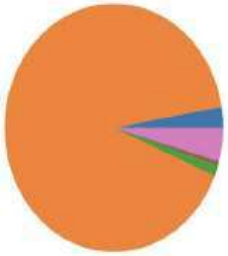
Geosciences



Physics



Chemistry & biology



Analysis platform

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

Purchases

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

In short

How to act?

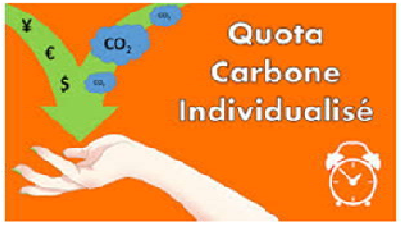
- Carry out the GHG inventory of the laboratory
- Put in place emission reduction tools
- Communicate

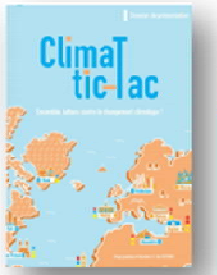
On which level?

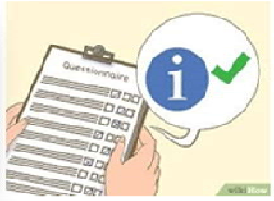
- At the individual level
- At the laboratory level
- At the supervisory level

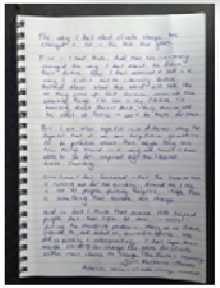
Reduction tools

- Awareness tools
- Regulatory & financial tools









Greenhouse gas inventory

GES 1point5

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

Greenhouse gas inventory steps

Data collection

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

Data processing

- Formatting datas

After

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

Greenhouse gas inventory steps

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

Results example

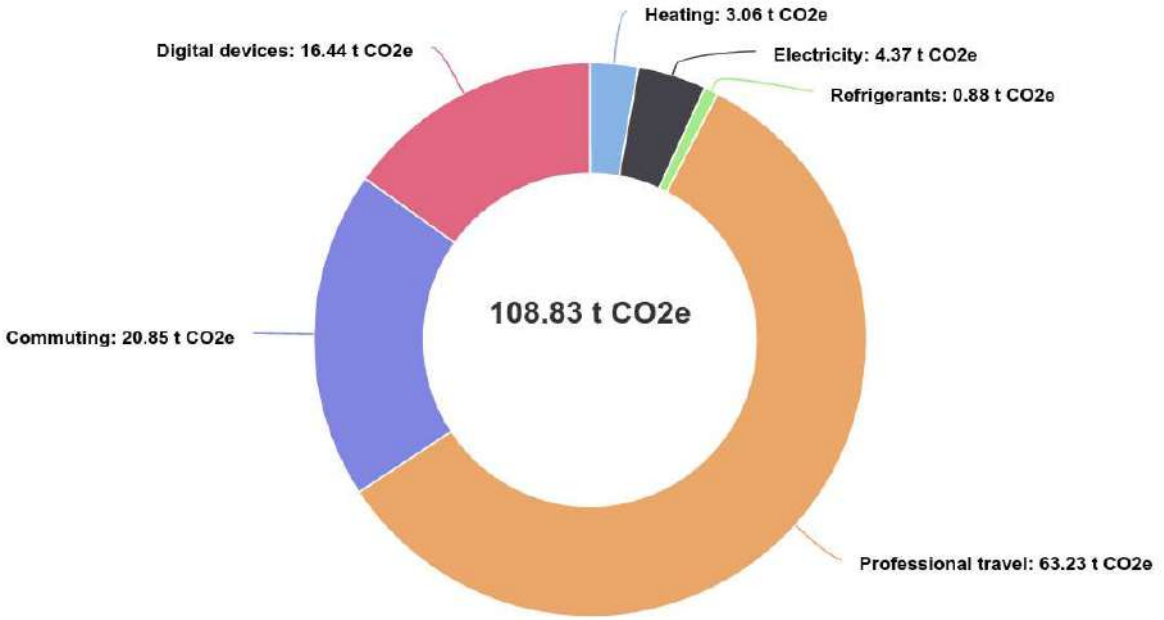
At the end

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

CARBON FOOTPRINT OF THE LABORATORY	CARBON FOOTPRINT *PER CAPITA*	CARBON INTENSITY
108.83 ± 34.15 t CO2e	**1 379 ± 431** kg CO2e	**124 ± 39** g CO2e / €

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 CO2e**.

Carbon footprint	Emissions in t CO2e	Share of the total footprint
Carbon footprint of buildings	**8.31 ± 1.62**	**8 %**
|-- 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 %**
Carbon footprint of travels	**84.07 ± 22.68**	**77 %**
|-- Commuting	20.85 ± 12.47	19 %
|-- Professional travel	63.23 ± 10.22	58 %
|-- Vehicles	2.76 ± 1.66	3 %
|-- Business travel	60.47 ± 8.56	56 %
Total carbon footprint	**108.83 ± 34.16**	**100 %**



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

To go further

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

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Thank you for your attention

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