# CEE-M Carbon Footprint

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# Outline

# *Introduction*

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- It is imperative to accelerate and deepen efforts to **control** greenhouse gas emissions **(GHG)**
- France has determined greenhouse gas emission **reduction targets**
  - Achieving carbon neutrality by 2050
  - Reducing in 40% the GHG by 2030 vs 1990
- There is a need to **evaluate** the carbon footprint of the **research**

# Introduction

**Carbon footprint CEE-M:** Assessment of the amount of greenhouse gases emitted into the atmosphere in a year by the activities of the laboratory

## Labos1.5 Initiative

- Academics from diverse backgrounds
- Understanding the environmental impact of research activities
- Promoting the use of Labos1.5 tool
  - Estimating the carbon footprint of a laboratory
  - Following the regulatory format in France
  - Through a Greenhouse Gas Emissions Inventory (GHGI)

# *Specifications*

# General Specifications

It is necessary to set the **boundaries** of the evaluation

- **Organization:** Composed by the INRAE, Institute Agro, CNRS and University of Montpellier
- **Time frame:** Annual and covers four years, from 2019 to 2022
- **Operation:** By categories such as nutrition, buildings, purchases, digital devices, professional travels and commuting

# Data Specifications

All data was collected with the help of the administrative staff

- **Buildings:** Energy consumption (electricity and gas)
- **Purchases:** Goods and services
- **Digital devices:** IT equipments
- **Professional travels:** Work-related travels

Creation and distribution of a survey to compile commuting data and include the footprint of nutrition

- **Commuting:** Home-to-work journeys
- **Nutrition:** Dietary habits

# Quiz

https://qruiz.net/Q/?41Qmoi

# *Results*

# Overall Results

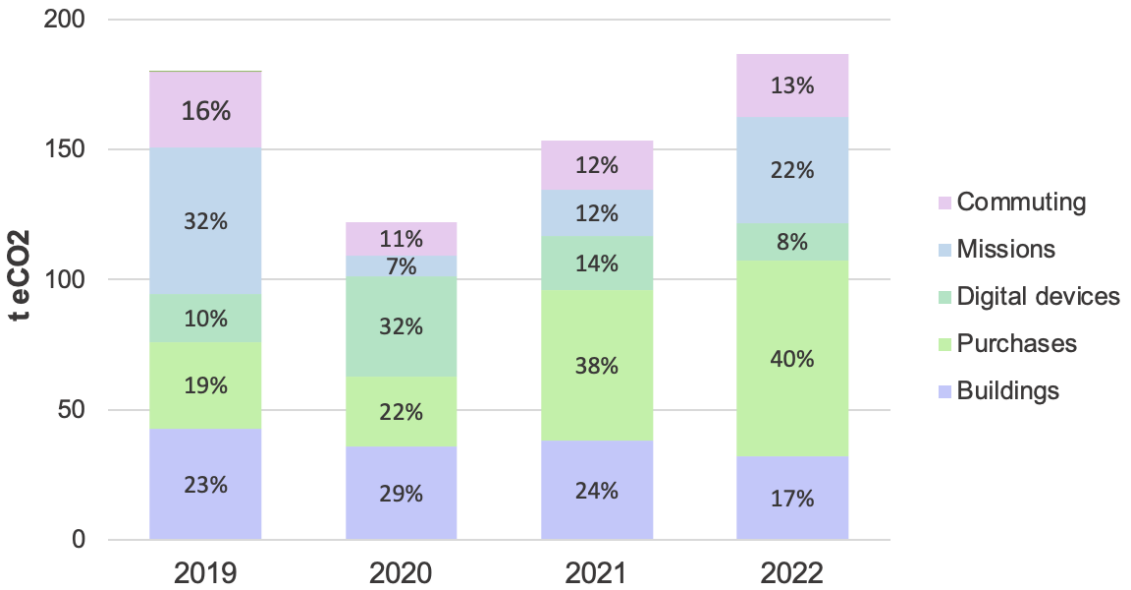


Figure 1: CEE-M carbon footprint by year

- On average the footprint is 2.3 t e$CO_2$/pers
- Strong reduction in missions (2020-2021)
- Purchases has the greatest impact

# Compared results

The carbon footprint of the CEE-M in per capita terms is significantly lower when comparing with other laboratories

- 28% smaller than the average laboratory in France (Mariette et al., 2022) (2.6 t e$CO_2$ vs 3.6 t e$CO_2$ for 2019)
- 55% smaller than the footprint of a geoscience laboratory (2.6 t e$CO_2$ vs 5.8 t e$CO_2$ for 2019)
- 13% higher when compared with another laboratory specialized in economics (GAEL) (1.9 t e$CO_2$ vs 1.7 t e$CO_2$ for 2020)

# Results by category

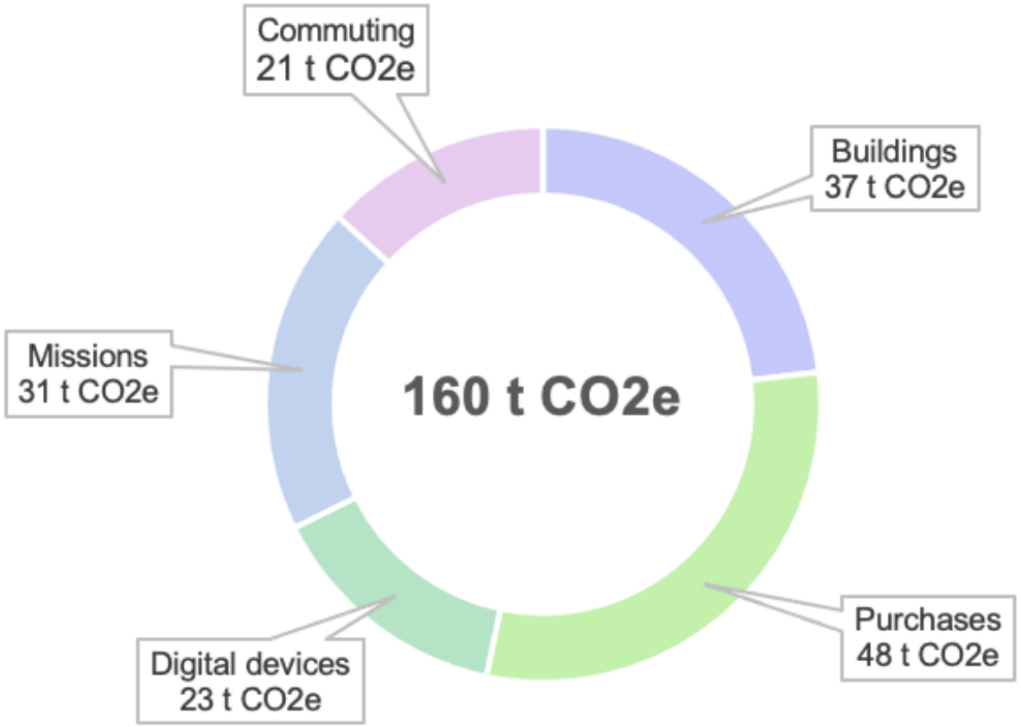


Figure 2: CEE-M average carbon footprint by category

# Purchases

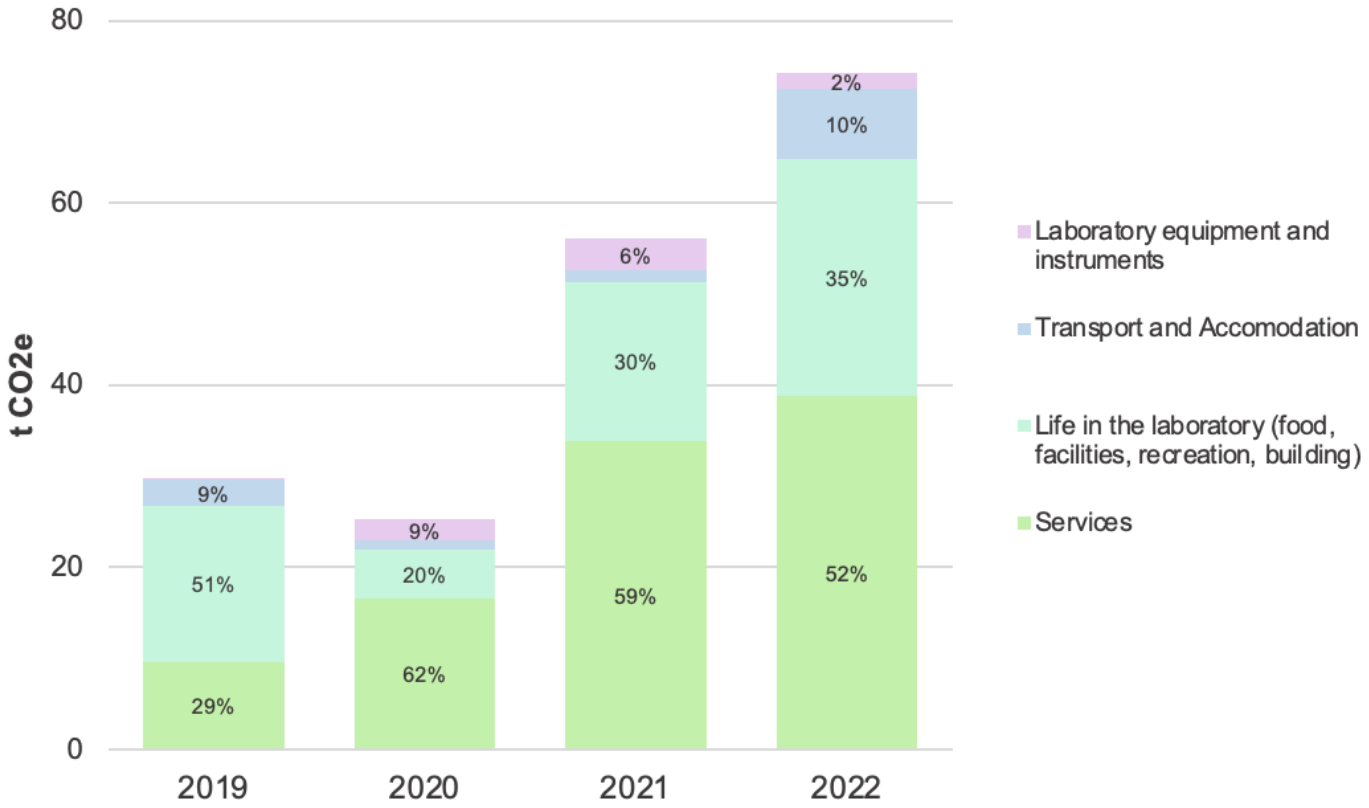


Figure 3: Annual CEE-M carbon footprint purchases by subcategory

# Digital devices

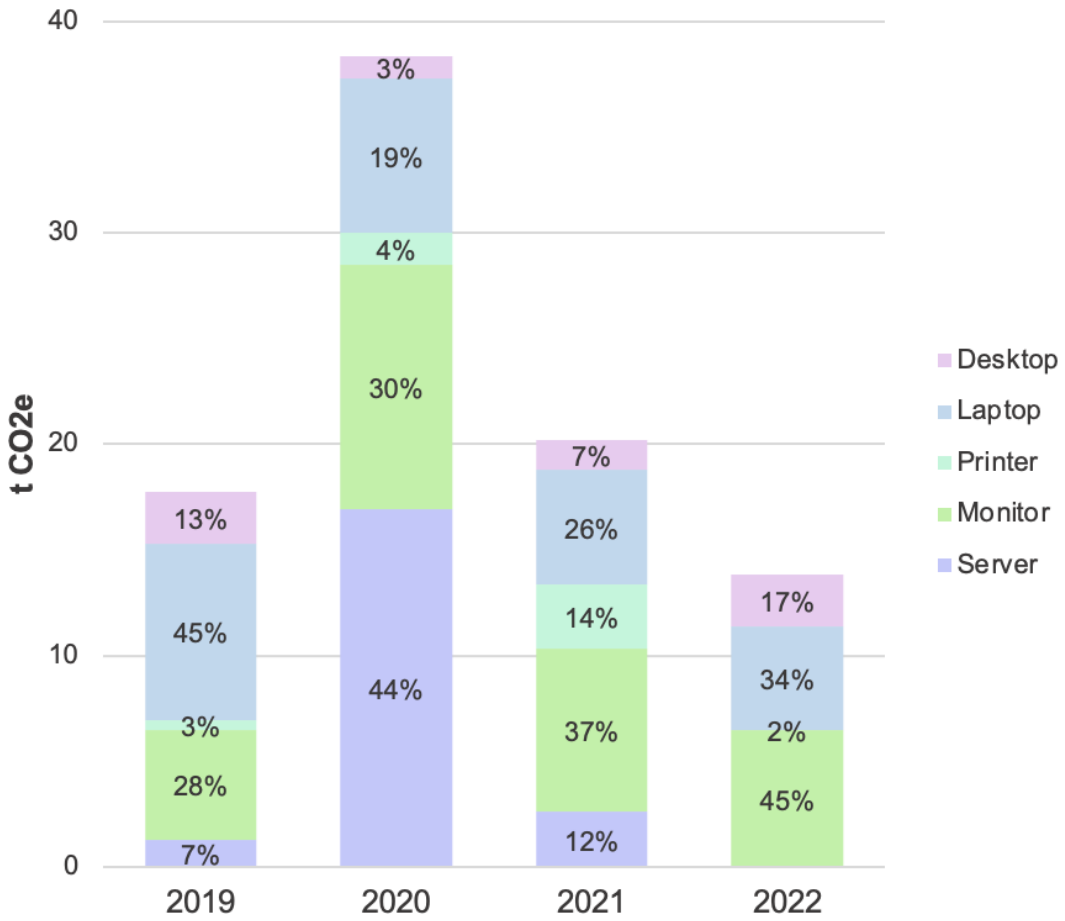


Figure 4: Annual CEE-M carbon footprint digital devices by subcategory

# Professional travels

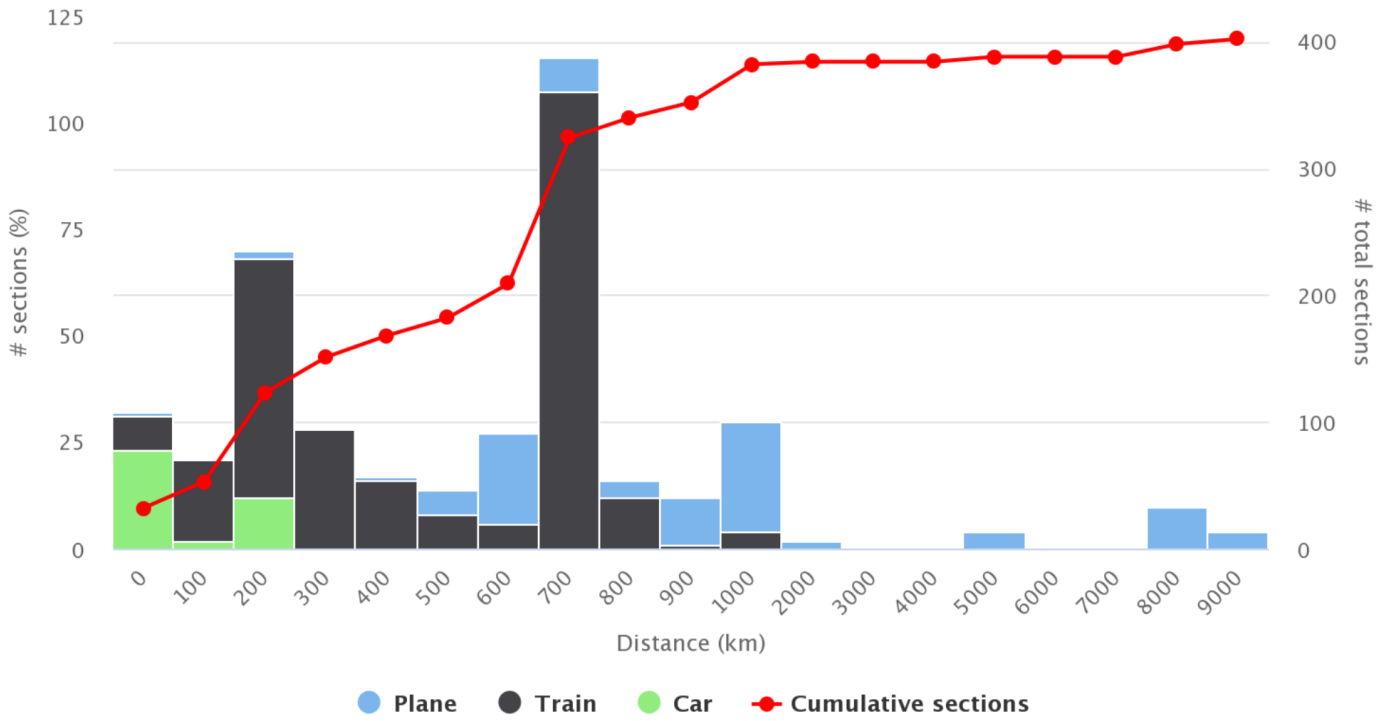


Figure 5: Number of travels by transport mode 2022

# Professional travels

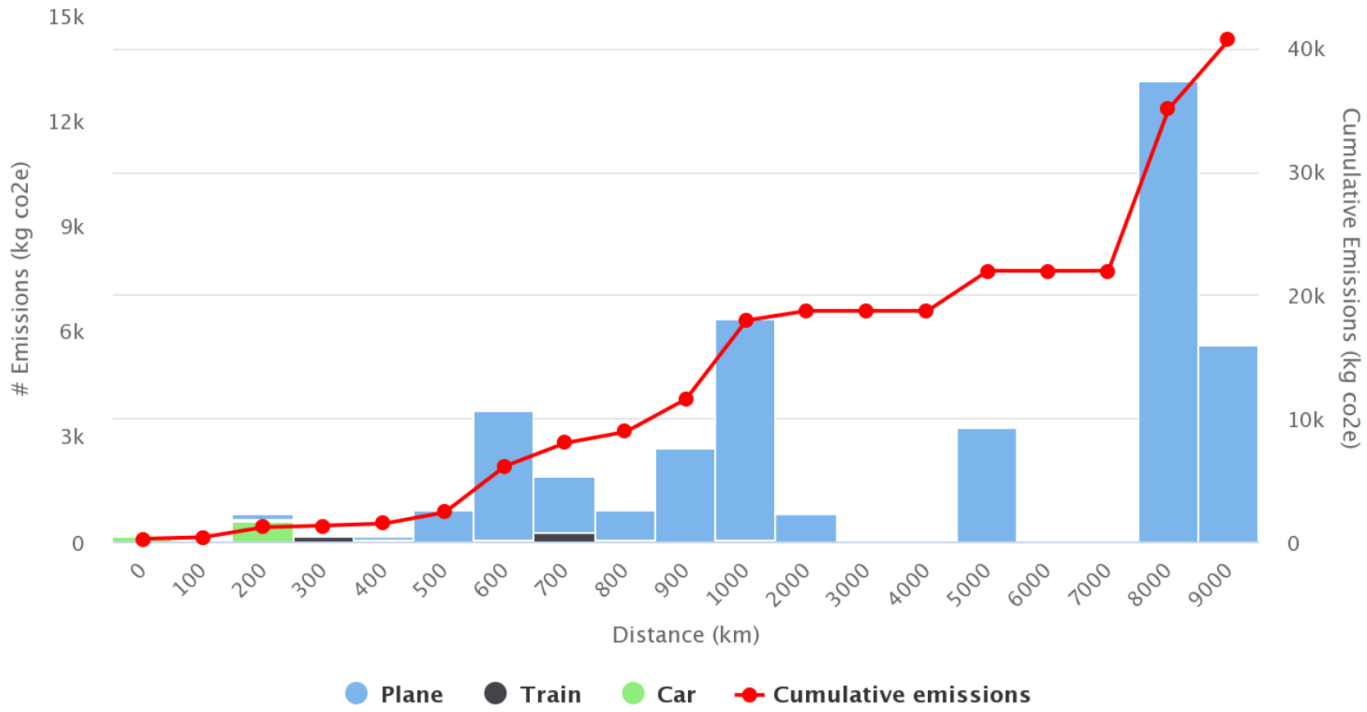


Figure 6: Professional travels emissions by mode of transport 2022

# Commuting

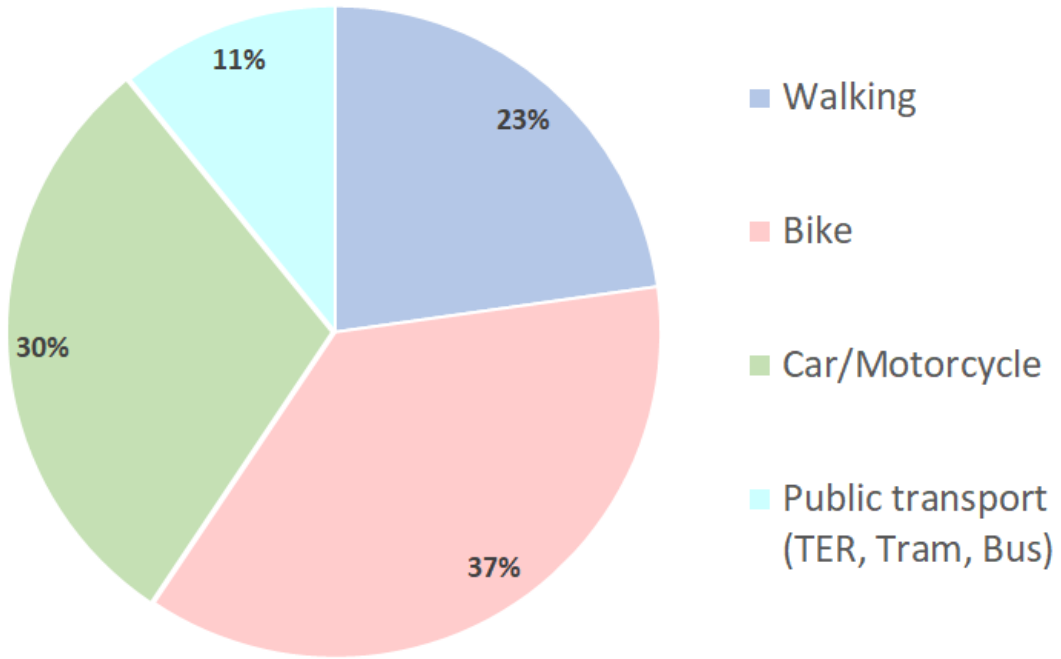


Figure 7: Transportation mode distribution for commuting 2022

- In 2022, cars represent 86% of commuting footprint

# Nutrition

| Meal type | kg e$CO_2$ / meal | Total per week | t e$CO_2$/pers |
|---|---|---|---|
| White meat | 1.35 | 68 | 0.08 |
| Red meat | 6.29 | 27 | 0.14 |
| Vegetarian | 0.51 | 17 | 0.00 |

Table 1: Carbon footprint by type of meal for 2022

- Nutrition represents around 9% of the CEE-M total carbon footprint in 2022.
- A change of 50% in red meat by vegetarian meal would imply a reduction about 3% of the total footprint.

# *Reduction Scenarios*

# Reduction scenarios

## Moderate changes

| Reduction measure | Overall footprint reduction (%) |
|---|---|
| Switching meat to vegetarian meal by 25% | 2.2 |
| Increasing lifespan of laptop by 25% | 1.5 |
| Replacing plane in France for trips under 840 km | 1.7 |
| Increasing the number of carpoolers by 2 | 7.0 |
| Total | 12.4 |

Table 2: First scenario

# Reduction scenarios

## Significant changes

| Reduction measure | Overall footprint reduction (%) |
|---|---|
| Switching meat to vegetarian meal 50% | 4.4 |
| Increasing lifespan of laptop by 50% | 2.6 |
| Replacing plane for trips under 1000 km | 6.0 |
| Increasing the number of carpoolers by 3 | 8.0 |
| Total | 21 |

Table 3: Second scenario

# Survey

If the CEE-M collectively agreed on mandatory measures to reduce emissions, which option would you prefer?

https://qruiz.net/Q/?6Fmas0

# *Conclusion*

# Conclusion

- On average, between 2019 and 2022 the CEE-M carbon footprint is 160 t e$CO_2$ and 2.3 t e$CO_2$/pers.
- Purchase category represents the greatest impact follow by buildings missions, digital devices, commuting and nutrition.
- Under the scenarios of reduction the laboratory can achieve a decrease of 12.4% (1) and 21% (2) of its total carbon footprint.

# Quiz results!
# Who's the winner?

*Thanks for your attention*

# References


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# Data Specifications

Data was collected, processed and standardized through cleaning data procedures.

- **Buildings:**
  - Energy consumption (electricity and gas)
  - Two locations
  - Gross surface area, CEE-M area
  - Type or heating
- **Purchases:**
  - Goods and services
  - Use of monetary emission factors
  - Categorization by code NACRES

# Data Specification

- **Digital devices:**
  - IT equipment
  - Based on the EcoDiag tool from CNRS
  - Inclusion of manufacturing, distribution, and end-of-life phases.

- **Professional travels:**
  - Work-related travels
  - Departure and destination city
  - Mode of transportation

# Data Specification

- **Commuting:**
  - Home-to-work journeys
  - Creation and distribution of a survey (Response rate 72%)
  - Mode of transport, home-to-work distance, number of work office

- **Nutrition:**
  - Use of questionnaire
  - Meat consumption and cafeteria meals
  - Emission factors from ADEME's database