The Green House Gas Inventory of IRAP

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Context and aim

In 2023, IRAP staff and council voted a commitment to **reduce GHG emissions by 7% per year**. This decision was followed by the choice of reduction measures and group work for their implementation.

Two year later, how have GHG emissions of the lab evolved ? What are the most pressing domains to be addressed ?

We update the green house gas (GHG) inventory at IRAP over civil years 2024 and 2025. We analyse the result, focusing on repartition and time evolution.

Method

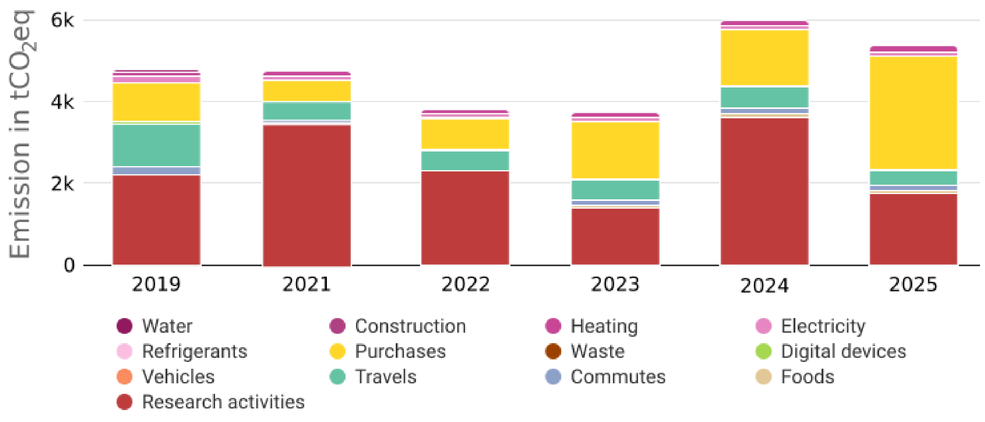
The calculation uses the **GES1point5 online tool**, based on the GHG Protocol methodology (https://ghgprotocol.org/).

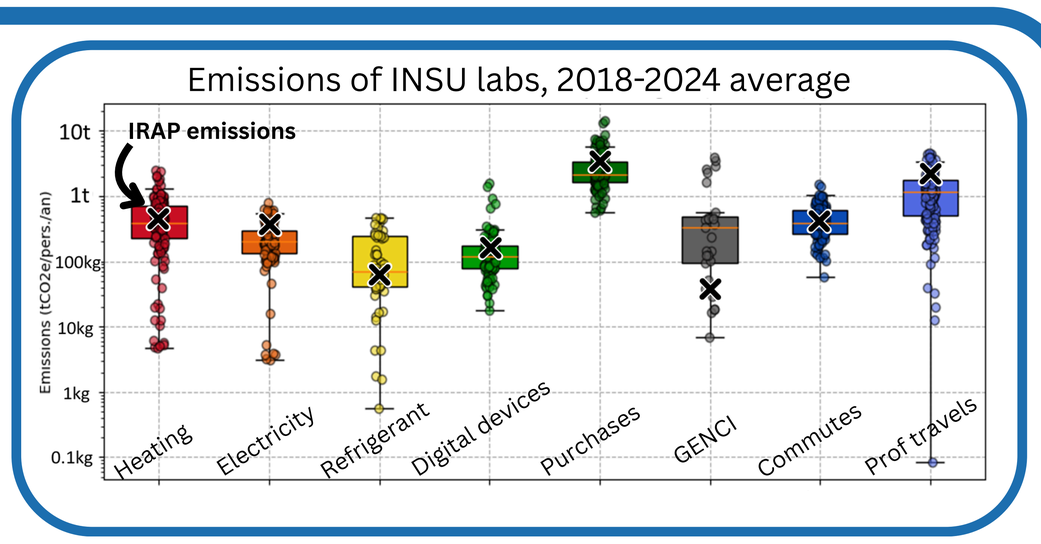
For 2024 and 2025, we refine the method to evaluate **GHG emissions per thematic group for purchase and professional travels**. These sections only include purchases from CNRS funds and exclude Toulouse University (which contributes marginally to previous inventories). The calculation excludes digital devices, which were also shown to contribute marginally.

The impact of research infrastructures is evaluated following Jürgen et al. (2024).

General time variation

GHG emissions have reduced between 2019 and 2023 by 22% in total, and approximately 6.6% per year. However, emissions have risen again by 43% between 2023 and 2025, with staff number unchanged.





The two main emitting domains are the **use of large research infrastructures** and **purchases**, followed by **professional travels**. Contrary to all other year, 2025 is dominated by purchases.

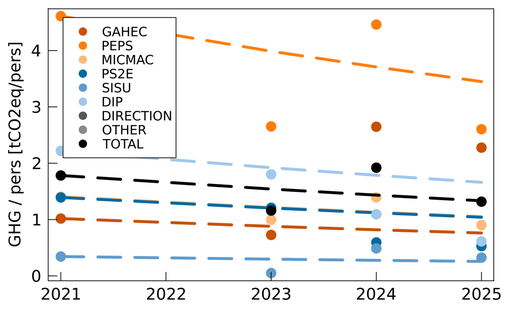
IRAP used to acheive its goal for 7% GHG emission reduction per year, but has drastically increased its emissions in 2024 and 2025.

Details on professional travel

Total GHG emissions linked to professional travels **positively follow the 7% decrease per year** (dashed lines). We decompose GHG emissions, based on

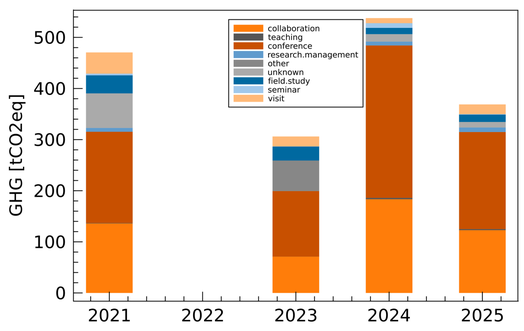
Thematic group:

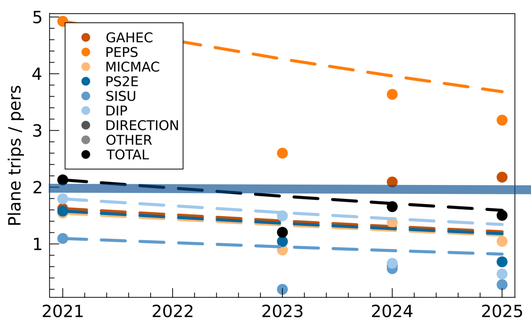
GHG emissions per person show important discrepancy between thematic groups. However, **almost all groups achieve a 7% reduction per year.**



Trip purpose:

Most emissions are due to conferences and collaborations. This provides insight as to where we should focus our reduction efforts.





Reduction principles:

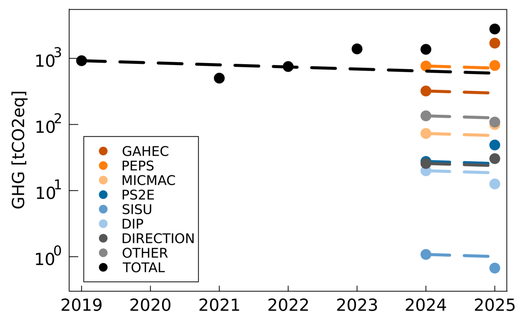
Working group 6 on professional travels recommended an overall **limitation to 2 flights/pers/year**.

Most of IRAP staff is below this limit, except in the PEPS and GAHEC teams.

Details on purchases

Total GHG emissions due to purchases have increase since 2019.

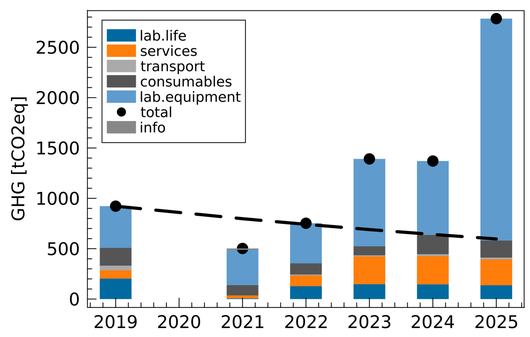
In 2025, they have soared, mostly due to the purchase of 6 cameras for the NectarCAM project.



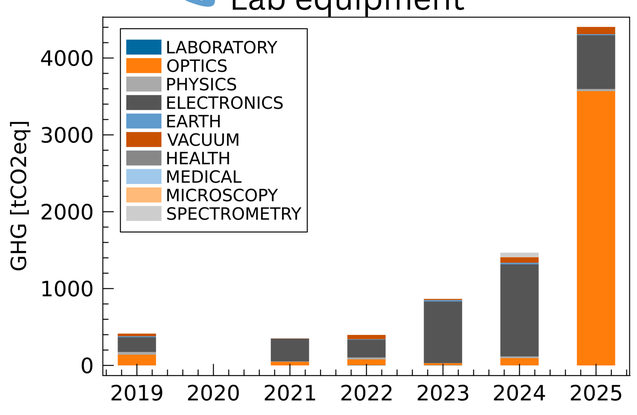
Emission per type of purchase:

This figure shows the GHG emissions splitted between the Labo1.5 categories.

The largest emissions are due to **lab equipments** by far.



Lab equipment



References

Knödlseder, J., Coriat, M., Garnier, P. et al. Scenarios of future annual carbon footprints of astronomical research infrastructures. Nat Astron 8, 1478–1486 (2024). https://doi.org/10.1038/s41550-024-02346-0