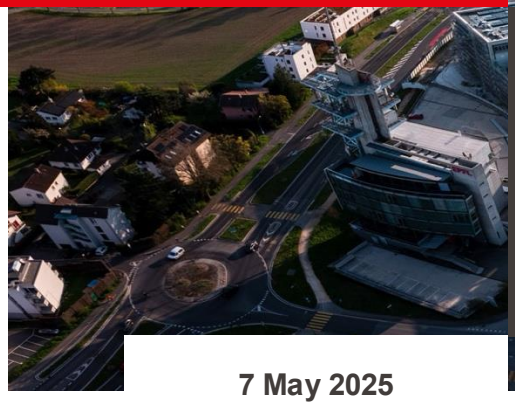
STI Sustainability strategy

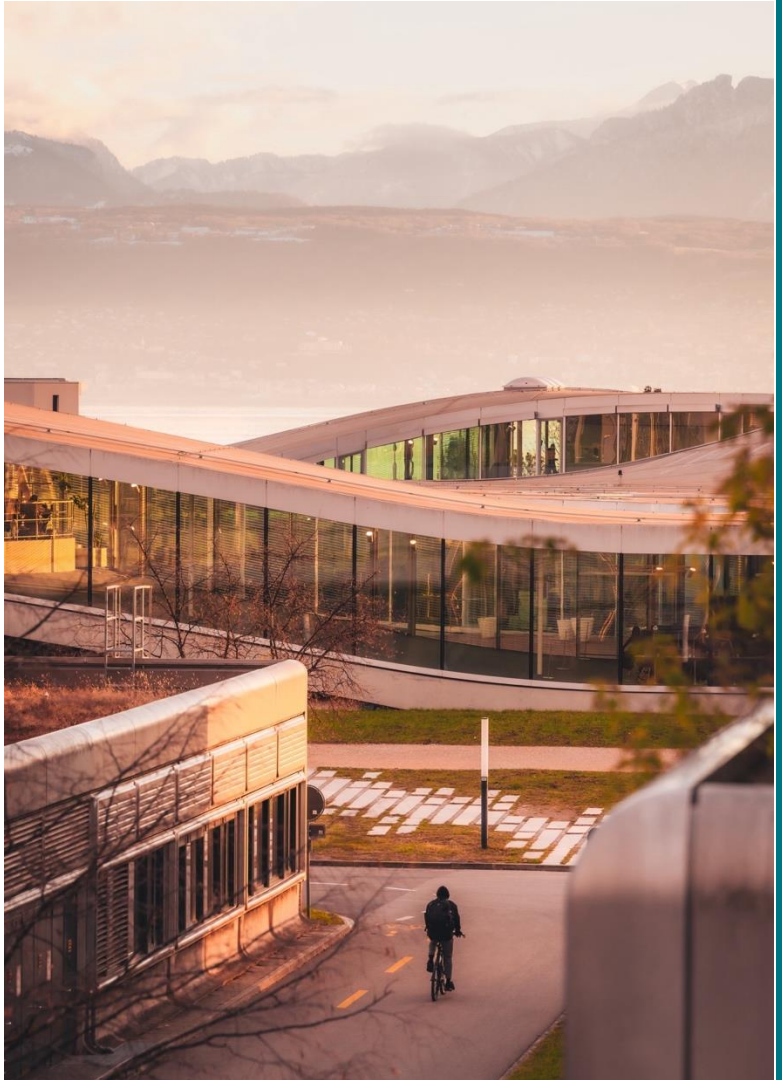


Dr. Anna Kounina Massé

STI Sustainability Manager

7 May 2025

École polytechnique fédérale de Lausanne



OUTLINE

General context

Sustainability in STI labs

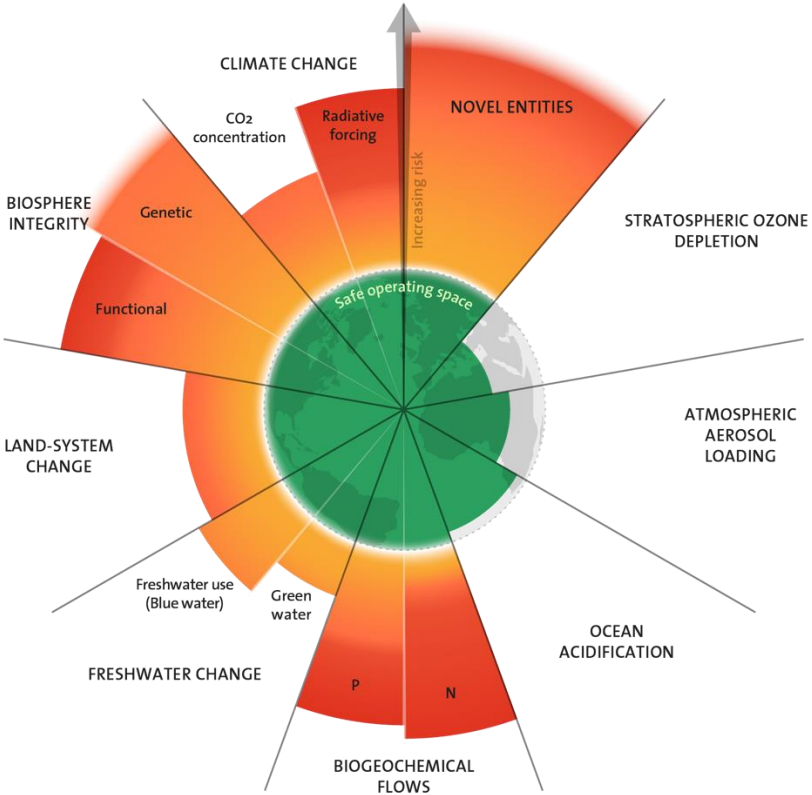
Assess: SML carbon footprint

Plan: action plan consolidation

Transform: key actions implementation

Next steps

6 out of 9 planetary boundaries crossed



The **Planetary Boundaries** are the safe limits for human pressure on the nine critical processes which together maintain a stable and resilient Earth.

As of 2023, **six of the nine** boundaries have been **transgressed**.

Crossing boundaries increases the risk of generating **large-scale abrupt or irreversible environmental changes**. Drastic changes will not necessarily happen overnight, but together the boundaries mark a critical threshold for increasing risks to people and the ecosystems we are part of.

https://www.stockholmresilience.org/research/planetary-boundaries.html

Rockström, J., Steffen, W., Noone, K. *et al.* A safe operating space for humanity. *Nature* **461**, 472-475 (2009). https://doi.org/10.1038/461472a

Legal framework in Switzerland

Paris Agreement

- Ratified on October 6, 2017
- Switzerland's commitment (2017)
  - **Reduce emissions by 50% by 2030** compared to 1990 levels
  - by taking into account part of the emission reductions achieved abroad

2017

2023

Climate and Innovation Act

- **Zero net emissions by 2050** (carbon neutrality)

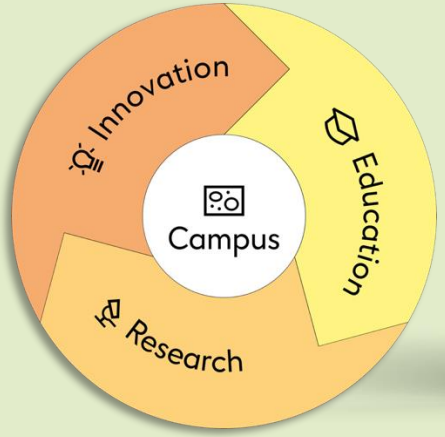
https://www.admin.ch/gov/fr/accueil/documentation/communiques.msg-id-76206.html

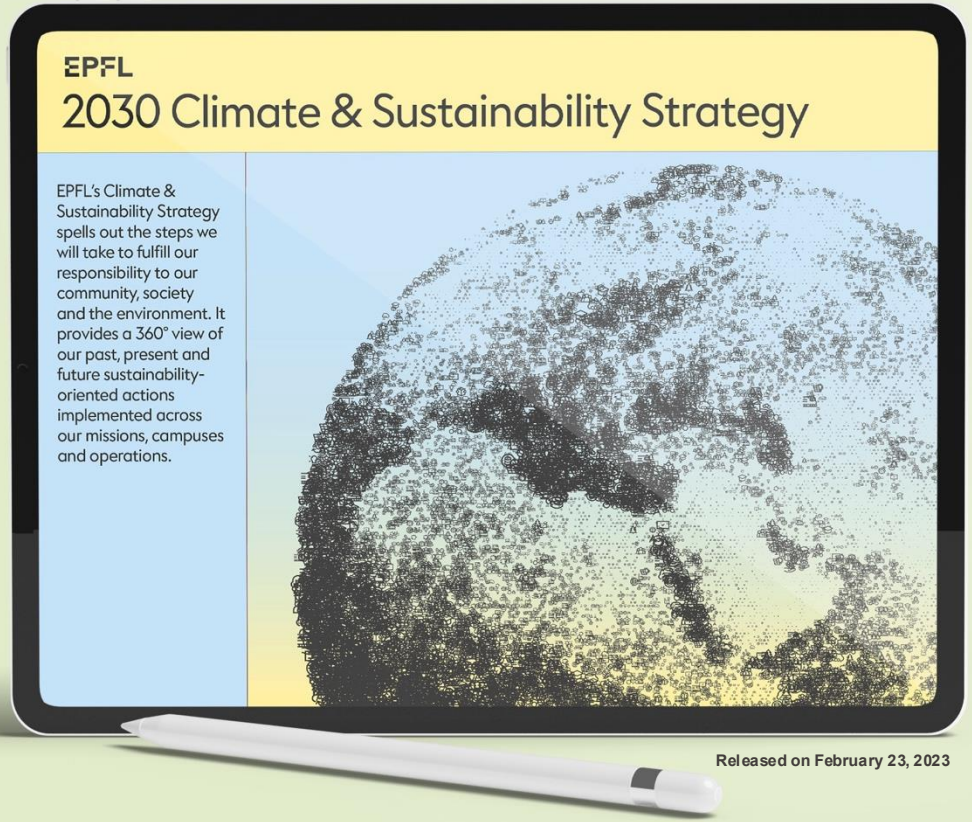
Source: eda.admin.ch

EPFL published a 2030 Climate & Sustainability Strategy

go.epfl.ch/sustainability_strategy

Interconnection between **education**, **research**, **innovation** and **campus operations**





Released on February 23, 2023

Objectives and fields of action

Reduce EPFL's greenhouse gas emissions by 40% by 2030

EDUCATION / OUTREACH

RESEARCH / GREEN LABS

INNOVATION

ENERGY / BUILDINGS

IT SYSTEMS

PROCUREMENTS / WASTE

FINANCES / FUNDING

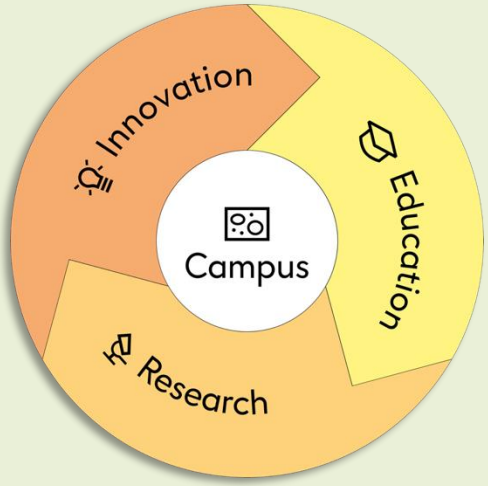
TRAVEL

COMMUTING

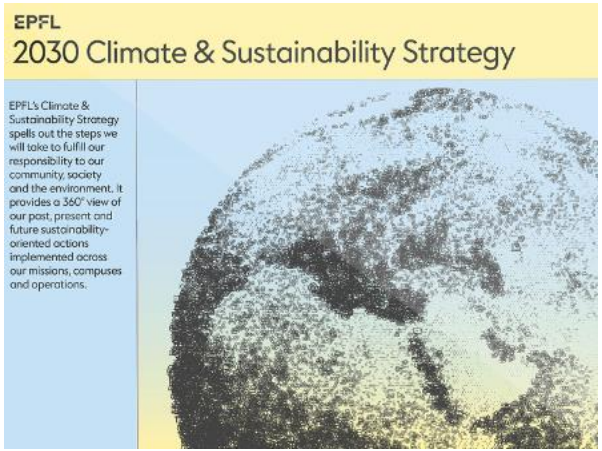
FOOD SERVICES

RESILIENT CAMPUSES

COMMUNITY / AWARENESS



Purchases are the highest contributor to the EPFL GHG emissions



Released on February 23, 2023
go.epfl.ch/sustainability_strategy

Total CO_2 balance
Breakdown of EPFL's partial GHG emissions in 2019

Travel	16,614 t CO_2-eq
Energy	16,130 t CO_2-eq
Food	6,062 t CO_2-eq
IT systems	4,829 t CO_2-eq
Commuting	3,783 t CO_2-eq

Estimation of GHG emissions of other purchases

Other purchases
42 000 t CO_2-eq

Approximate value
error of ± 20'000 t

Most bio-chemical, consumable and equipment purchases come from lab activities[1]

[1] I am currently working on extracting detailed figures from the procurement team data

Q&A

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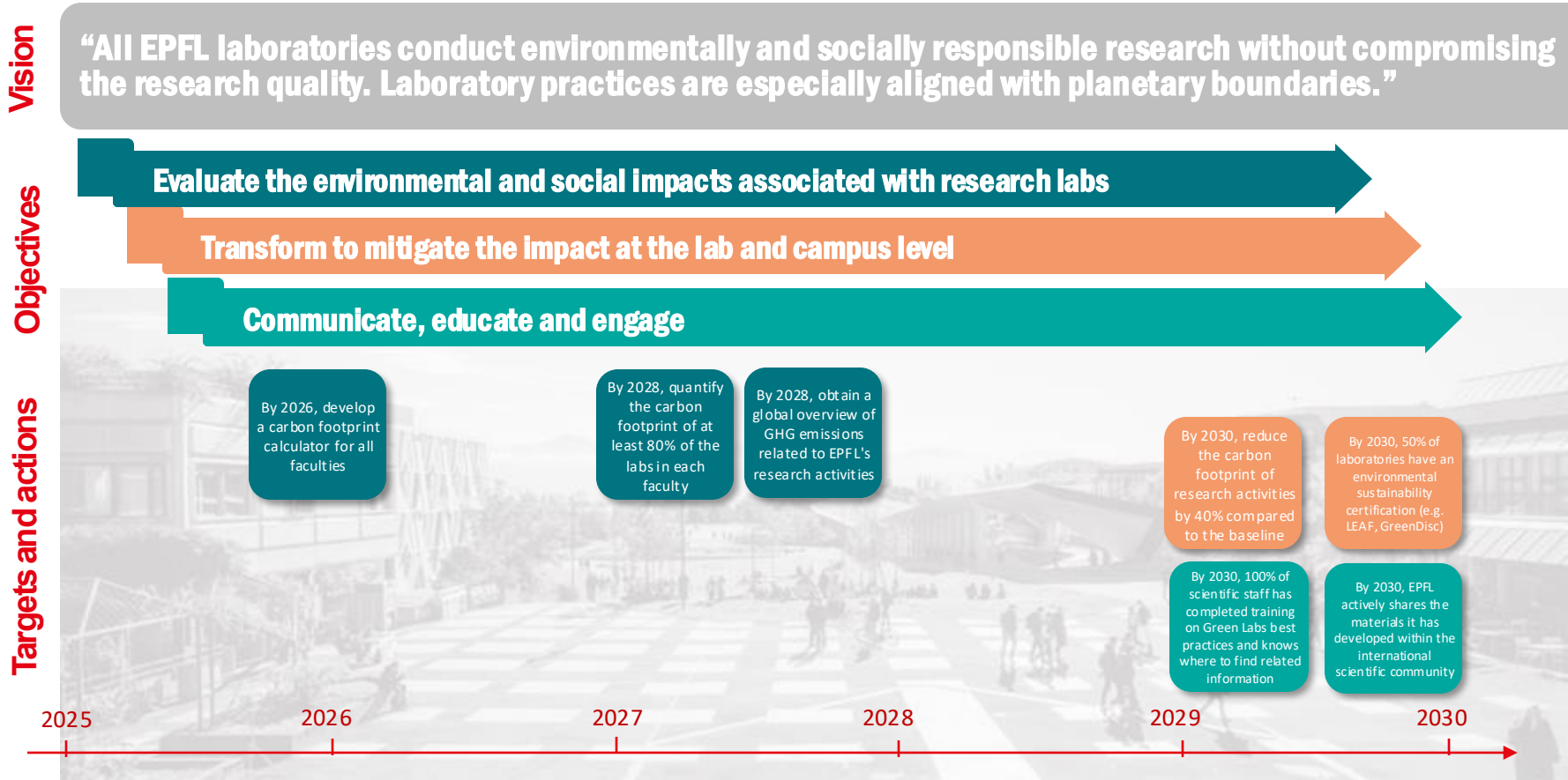
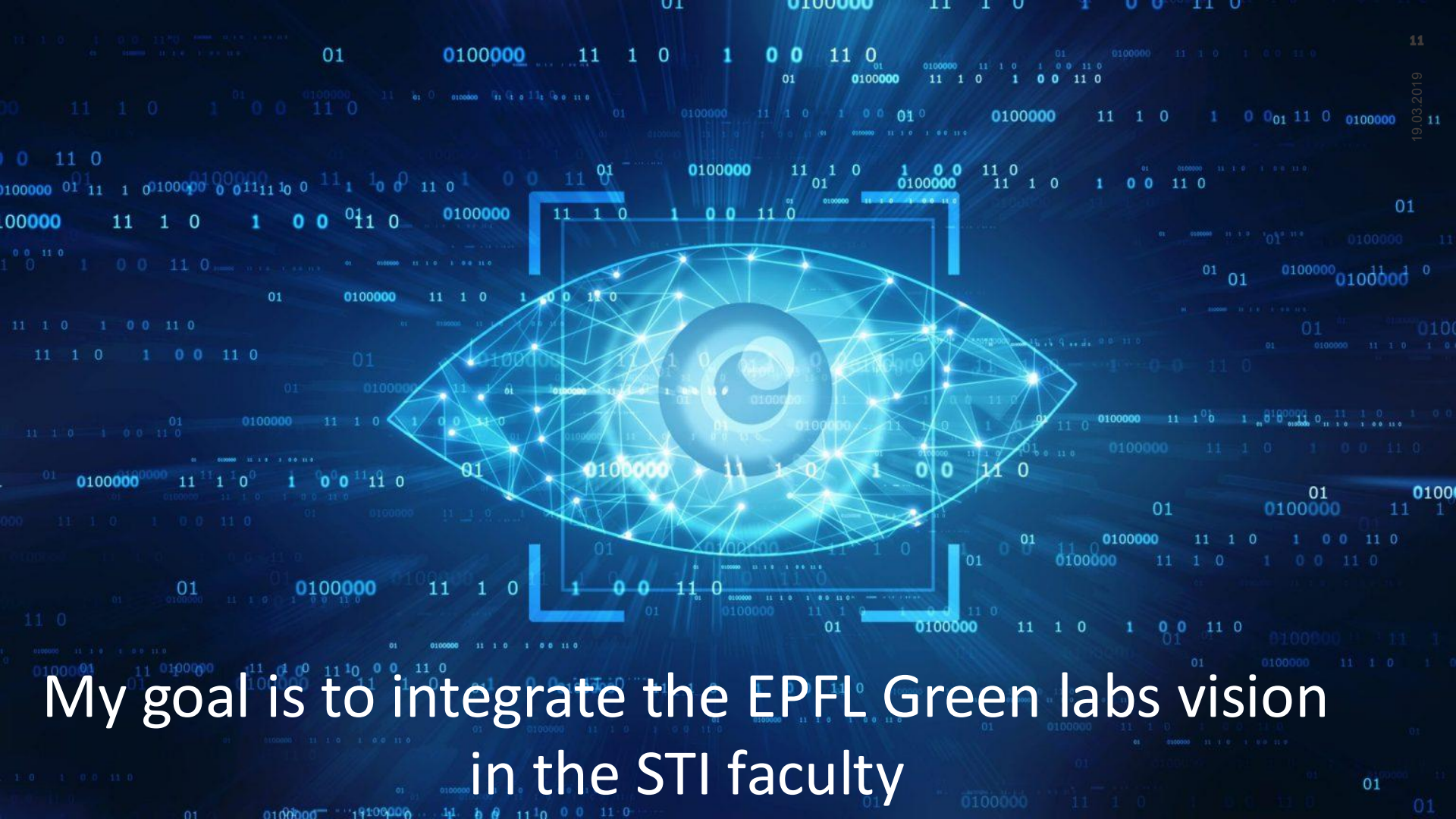
EPFL Green labs vision





My goal is to integrate the EPFL Green labs vision in the STI faculty

Potential benefits of a lab environmental assessment

Cost reduction (e.g. in case of equipment mutualisation)

Innovation: integrating sustainability in research

Leadership among academic institutions

Requirement for a sustainability strategy to apply to some grants

Risk management

Sustainability approach in STI

ASSESS

Perform an **environmental footprint** (carbon and potentially other indicators such as water, plastic) at the lab or project scale following the GHG Protocol and ISO 14040 or 14044 standards

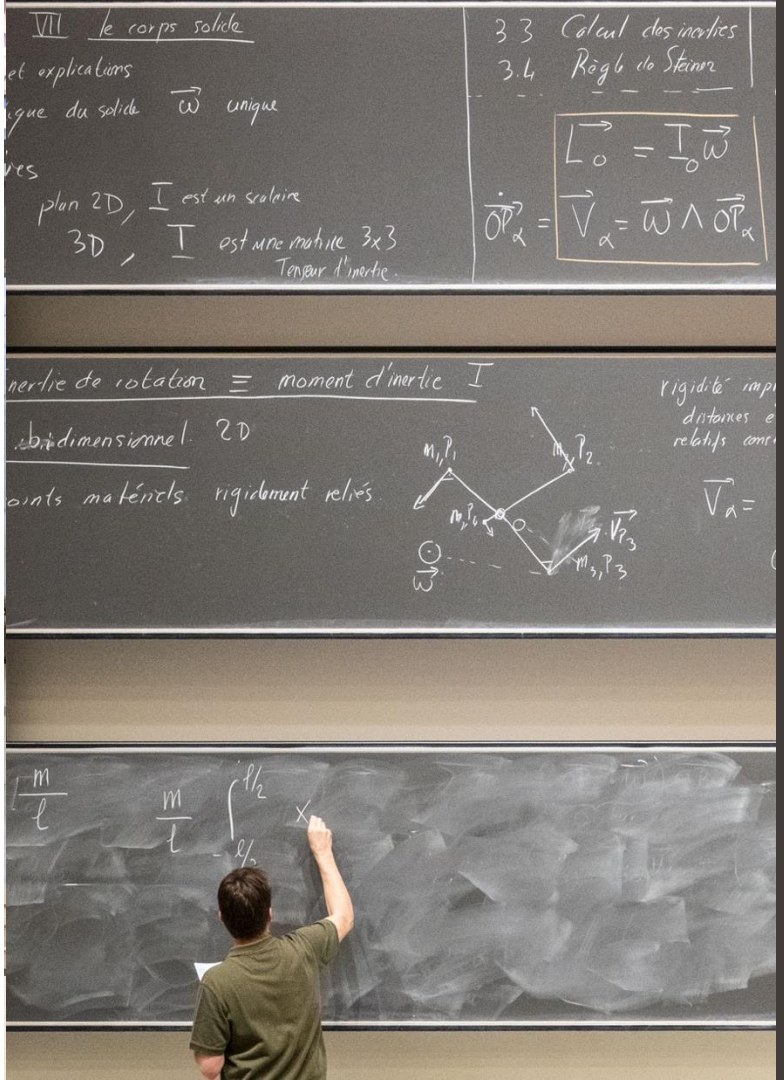
PLAN

Co-development of an **action plan** and **strategy** with the research team, by identifying actions that have high environmental impact reduction and high feasibility, keeping in mind the associated cost

TRANSFORM

Action plan implementation that can involves changes in lab operations, procurement, waste management, as well as stakeholder engagement and communication to the wider STI / EPFL community

Q&A



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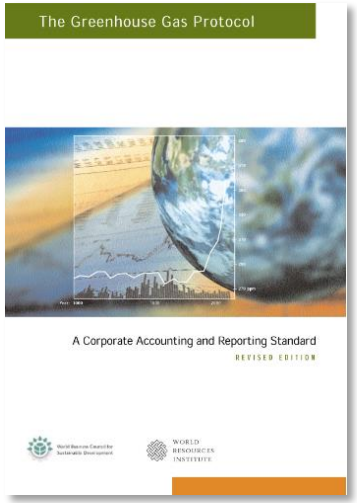
Key frameworks, guidelines and standards

ORGANIZATION LEVEL

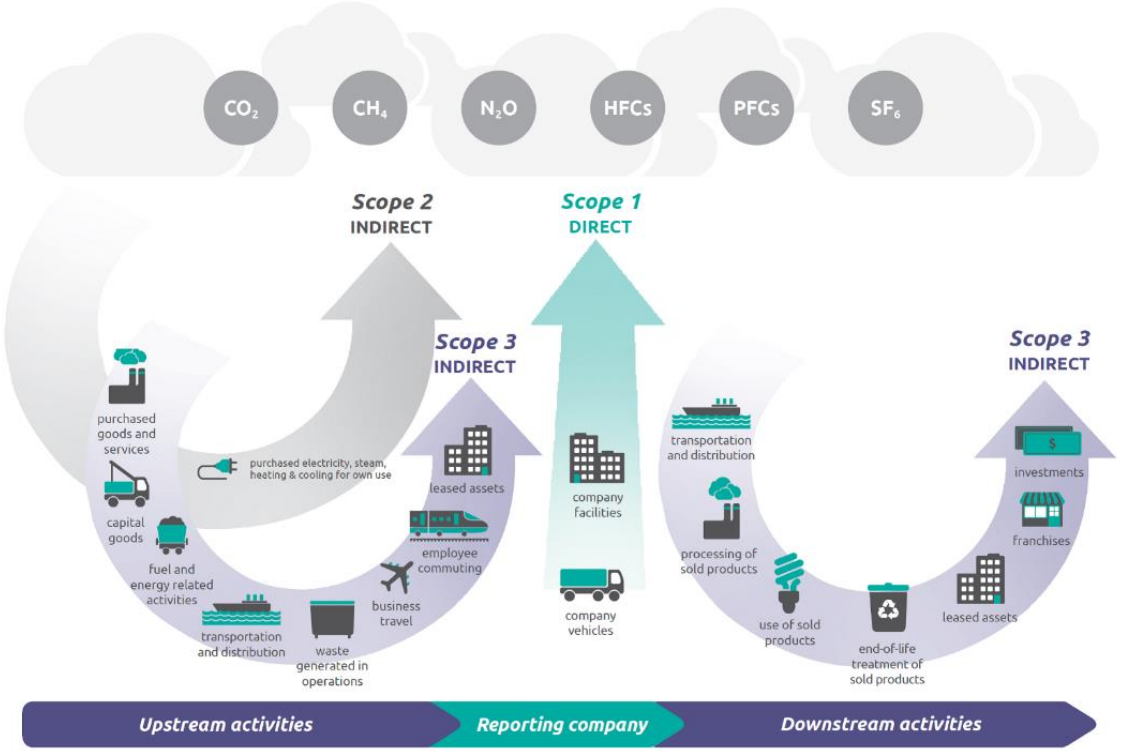


- The **GHG Protocol Corporate Accounting and Reporting Standard** provides requirements and guidance for companies and other organizations preparing a corporate-level GHG emissions inventory.

PRODUCT LEVEL

- The **ISO 14040:2006 and 14044:2006** standards describe the principles and framework for life cycle assessment (LCA)

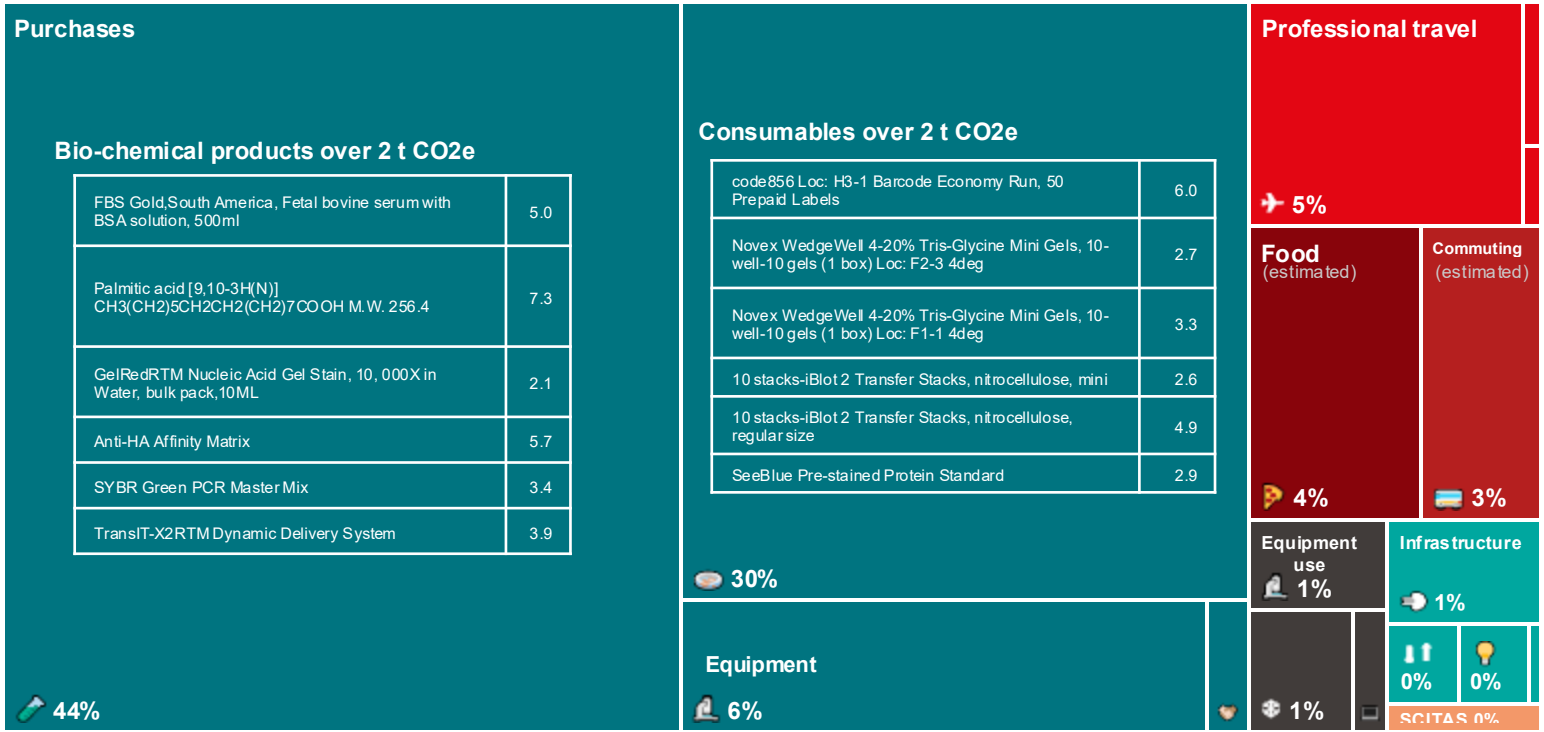
Overview of scopes and emissions across a value chain according to the GHG Protocol



Generic carbon footprint results for a wet lab

Total lab impact : **222.2** t CO_2e / year

Impact per person **17.1** t CO_2e / year



Assess

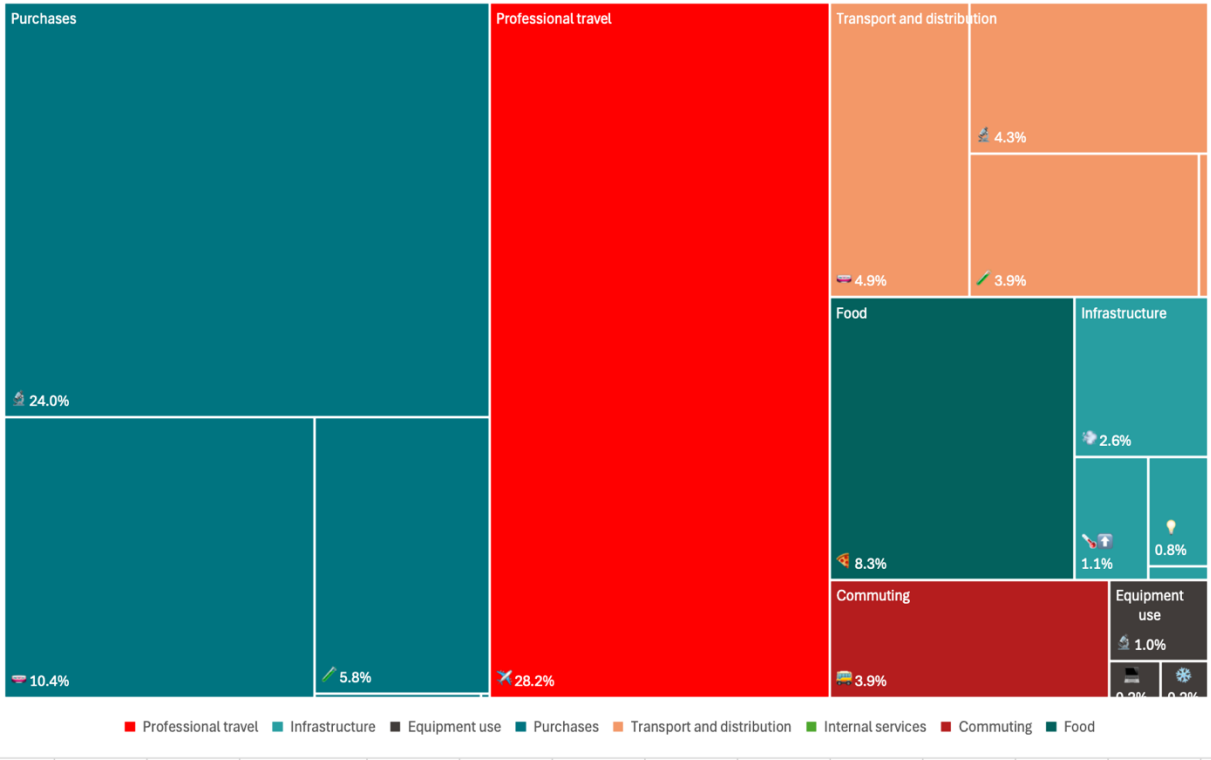
SML carbon footprint results for 2024

Total lab impact : **102** t CO_2e / year

Impact per person **9** t CO_2e / year

Average per person in Switzerland:
14 t CO_2eq / year *

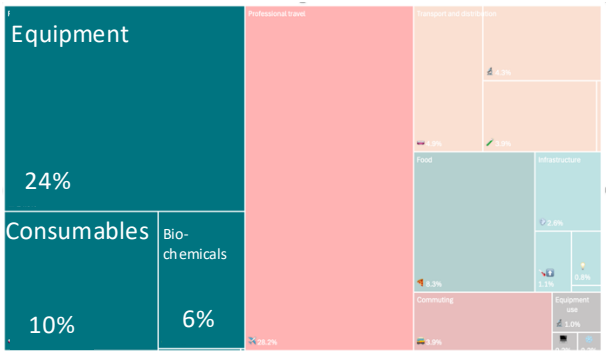
Objective per person:
2 t CO_2eq / year **



Assess

*Environment Switzerland 2018 Report of the Federal Council https://www.bafu.admin.ch/bafu/en/home/state/publications-on-the-state-of-the-environment/environment-switzerland-2018.html
**https://bonpote.com/objectif-2-tonnes-vrai-defi-ou-mauvaise-cible/

Purchases



Others

High uncertainty

Hotspots equipment

Item	Quantity	Carbon footprint in t CO2 eq
Viscometer microVISC -L	1	5
Bench-Top Hei-VAP Expert Control	1	4
Elix® Essential 5 Kit SZ	2	3
Centrifuge	1	1
KDS Legatoa,,cents 100, single syringe infusion pump,AC/DC input 100 - 240 V AC, EuroPlug (flat 2-pin)	2	1

Hotspots consumables

Item	Quantity	Carbon footprint in t CO2 eq
Calibration kit Dextran, nominal Mp 180 - 225,000 Da	1	0.8
Aminex HPX-87H Column, 300 x 7.8 mm	1	0.5
Excalibur DÉSHYDRATEUR EXC10EL	1	0.4
PL aquagel-OH MIXED-H, 7.5 x 300 mm, 8 microm	1	0.4
Durapore(R) Membrane Filter, 0.65 microm	2	0.2

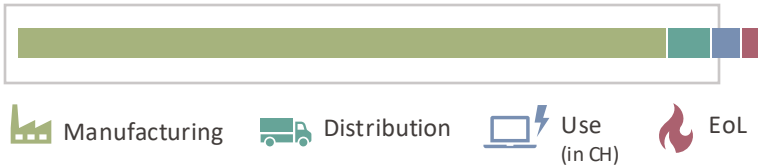
Hotspots bio-chemicals

Item	Quantity	Carbon footprint in t CO2 eq
Aldrich(R) macro-micro KBr pellet die	1	0.4
Silicone oil, high temperature, usable temperature range: 25 to 250?C (open system) and 25 to 315?C,2.5kg	1	0.3
Galactomannan (Carob; Low Viscosity)	3	0.2
Xyloglucan (Tamarind)	3	0.2
Cholesterol Quantitation Kit	1	0.2

Purchases

High uncertainty

Footprint of 1 laptop : ~ **200 kg CO2e**



Action levers

Equipment

- In most lifecycles, manufacturing is the single largest source of impact.
- Acquire second-hand or refurbished equipment when possible.
- Consider sharing equipment with other labs.
- Extend the lifespan of exisiting equipment for as long as possible.
- Avoid unnecessary end-of-year purchasing.

Consumables and biochemicals

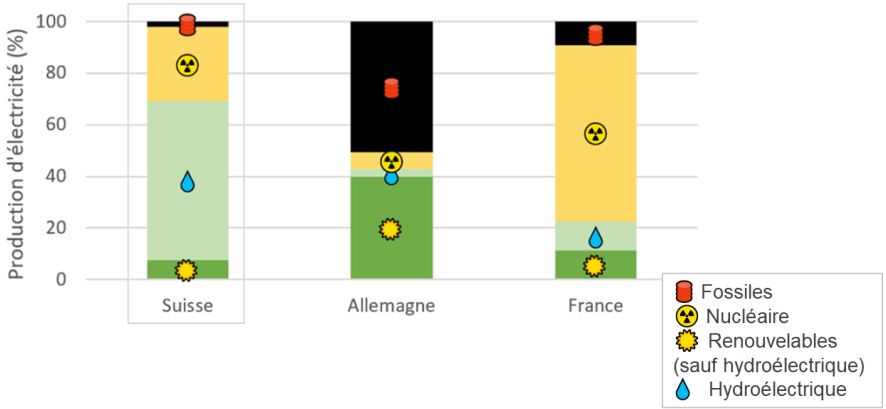
- Spend time on experiment design.
- Ask around or use Catalyse to find out who you could borrow from before purchasing .
- Monitor expiration dates.

Electricity (equipment)

Medium uncertainty

Hotspots equipment electricity consumption

Item	Carbon footprint in t CO2 eq
Epsilon 2-4 LSCplus	0.54
Pilot Microfluidizer® Processor	0.11
Tuttnauer Laboratory-Sterilizer 5075 ELC	0.09
Elix® Essential 5 Kit SZ	0.07
Elix® Essential 3 Kit SZ	0.07



Action levers

- The share of electricity consumption in the overall carbon footprint can vary greatly depending on the lab's geographical location and corresponding electricity mix.

Scientific equipment

- Turn off whenever possible and avoid leaving on standby mode.

IT equipment

- Avoid leaving on standby mode.
- Organize an annual cleanout of large files that have become obsolete.

Key takeaways

PURCHASES

- Purchases contribute overall to **40%** of the SML carbon footprint
- **Equipment** is the largest contributor and manufacturing is often the life cycle stage that has the highest impact.
- Action levers to mitigate the **equipment purchase** carbon footprint are to **acquire second-hand or refurbished equipment** when possible, **consider sharing equipment** with other labs, **extend the lifespan** of exisiting equipment for as long as possible.
- Action levers to mitigate the **consumables and biochemicals purchase** carbon footprint are to spend time on experiment design, ask around or use Catalyse to find out who you could borrow from before purchasing and monitor expiration dates.

PROFESSIONAL TRAVEL

- Professional travel contribute overall to **28%** of the SML carbon footprint
- Action levers to mitigate the professional travel carbon footprint are **take the train** to avoid flying within Europe, **use video-conferencing** or **local hub** options available rather than taking intercontinental flights, **choose economy** rather than business class if **avoid layovers** if flying.

TRANSPORT AND DISTRIBUTION

- Transport and distribution contribute overall to **13%** of the SML carbon footprint
- Action levers to mitigate the transport and distribution carbon footprint are to make bulk purchases to optimize transportation and packaging for delivery.

Q&A

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PLAN

Co-development of an **action plan** and **strategy** with the research team, by identifying actions that have high environmental impact reduction and high feasibility, keeping in mind the associated cost

TRANSFORM

Action plan implementation that can involves changes in lab operations, procurement, waste management, as well as stakeholder engagement and communication to the wider STI / EPFL community

Ideation topics

1. PURCHASES, TRANSPORT AND DISTRIBUTION

- Which purchases can we improve? - greener supplier or model
- Sharing or selling excess equipment
- Which routine steps to check sustainability should we take when making a purchase (to move towards bulk purchases?
- Are there reuse or recycling schemes from the suppliers? - ex containers, boxes etc?
- What consumables can we reduce or reuse?
- How can we extend IT equipment's lifespan?
- Can we use LEDs in research illumination? (not building lighting)

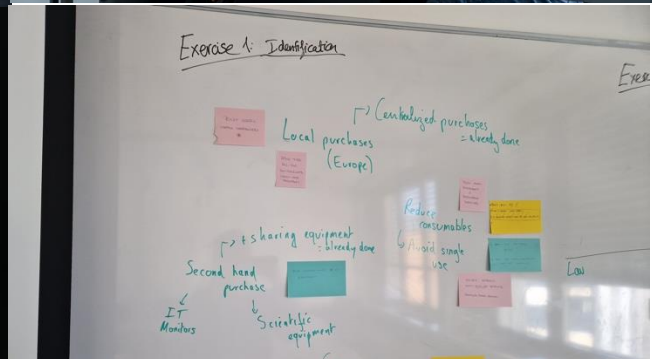
2. SUSTAINABLE LAB PRACTICES

- **Professional travel:** Can we reduce travel emissions and how ? What modes of transport can we use to avoid emissions linked to commuting?
- **Food:** How can we reduce my meat consumption? What are the best ways to consume more locally and regionally?
- **Electricity use:** What equipment/computers can be shut down or put on standby after use? What other energy efficiency measures can be taken?
- **Lab practices:** Shared protocols – standardised protocols that could be written and shared? Where could we share? Shared negative results and experimental improvements/optimisation – how? and where to share?

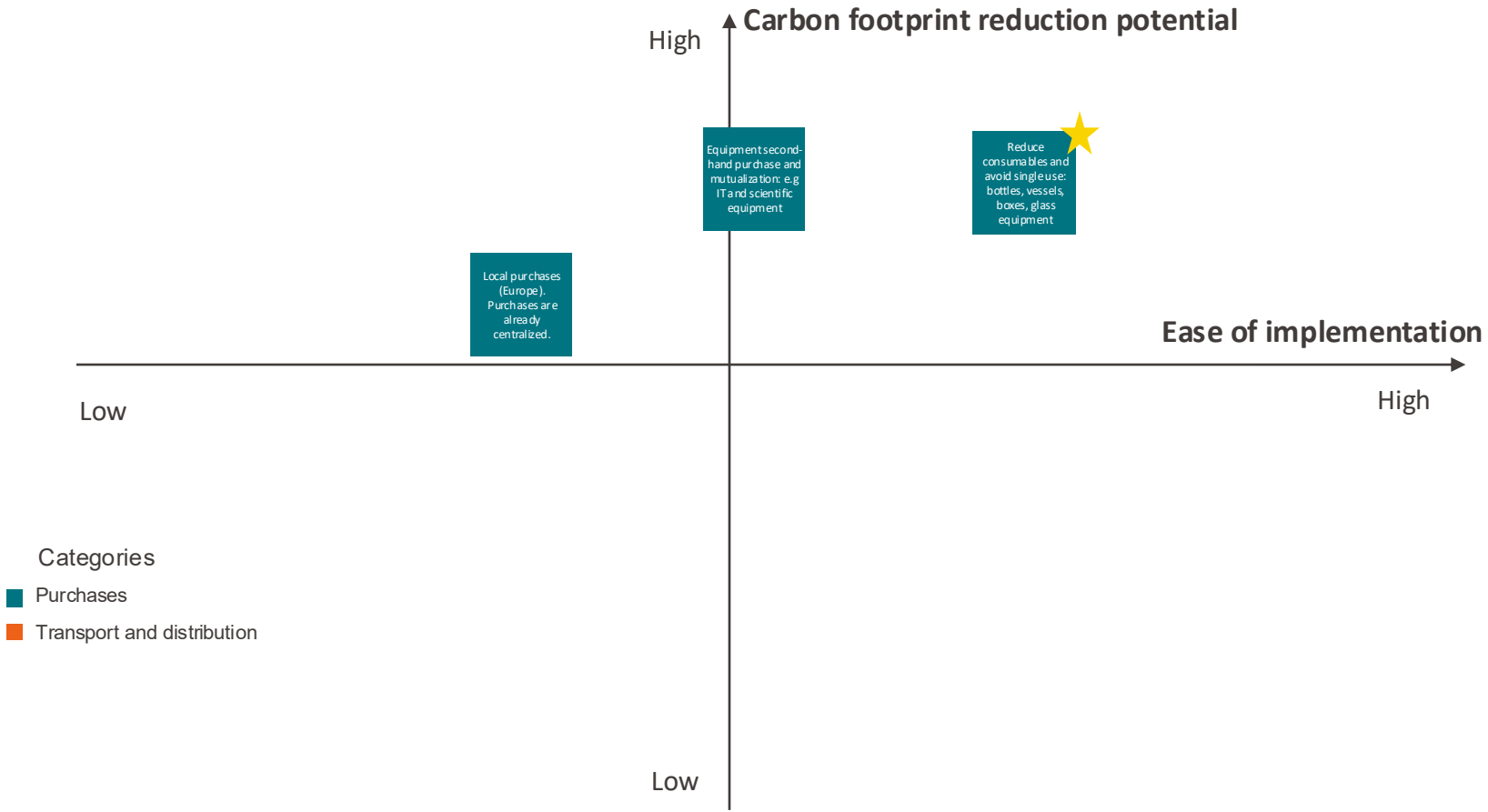
Engagement rules

- Listen with attention
- Speak with intention
- Don’t be afraid to ask questions

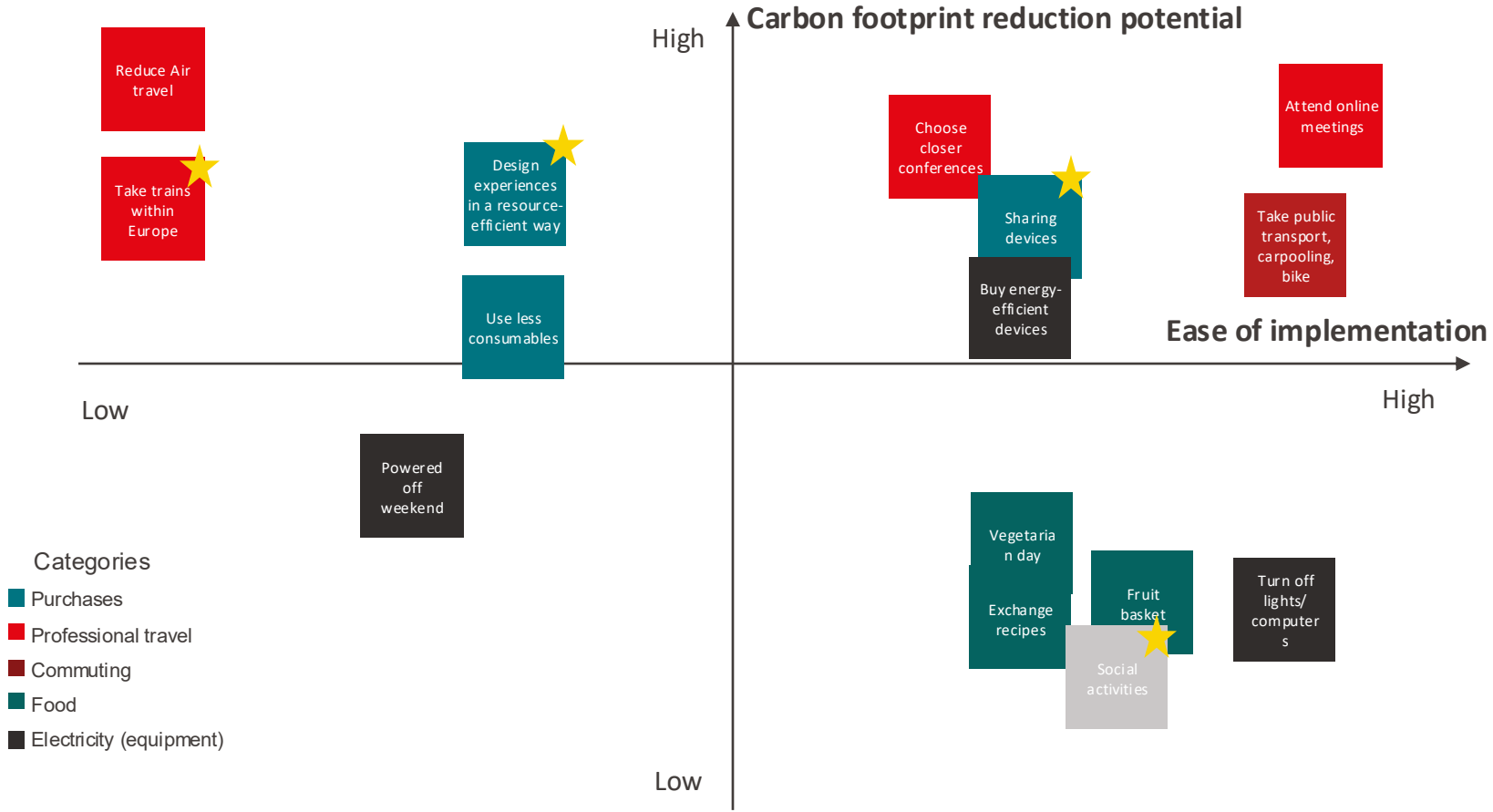
We are co-creating and are looking forward to your inputs ☺


Exercise 1: Identification
Centralized purchases
= already done
Local purchases
(Europe)
Reduce consumables
Avoid single use
+ sharing equipment
= already done
Second hand purchase
IT
Monitors
Scientific equipment
Low

PURCHASES, TRANSPORT AND DISTRIBUTION – group 1



SUSTAINABLE LAB PRACTICES – group 2



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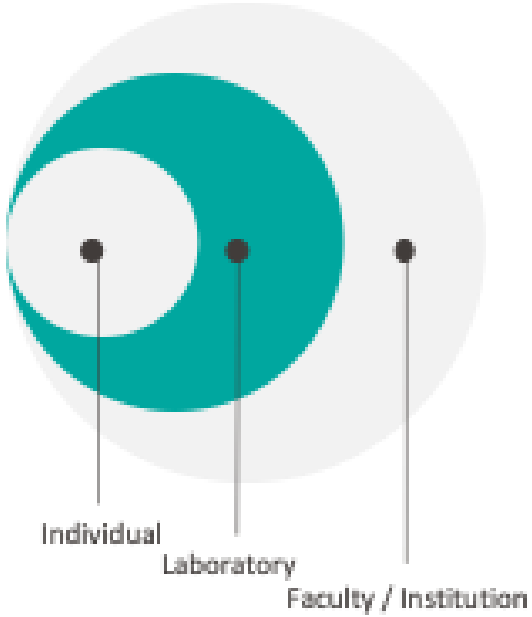
Actions can be taken at the individual, laboratory or faculty / institution level



Action levels

Examples of actions:

- **Individual level:** cycle to work, eat vegeterian food
- **Laboratory level:** centralize purchases, optimize the use of consumables, minimize waste
- **Faculty / Institution level:** set up a reuse plateform, provide guidance for ventilation practices

We will first discuss actions that can be taken at the laboratory level.

SML actions prioritization 2025

PURCHASES, TRANSPORT AND DISTRIBUTION

★ **Reduce unnecessary purchases and avoid single use:**
- Bottles, vessels, boxes, glass equipment

★ **Equipment second-hand purchase and mutualization:**
- e.g. IT and scientific equipment

Local suppliers
- Identify European suppliers

SUSTAINABLE LAB PRACTICES

★ **Design experiences in a resource-efficient way**

★ **Professional travel**
- Take trains within Europe

★ **Office life**
- Fruit basket
- Social activities

SML action plan timeline

Reduce unnecessary purchases and avoid single use
CHIARA

- Identify top 3 consumables use in terms of cost / volume
- For each consumable define an alternative option and a process to put it into place
- Organize a group presentation on alternative consumable choices
- Write a short document with best practices for consumable use, that can be printed as a poster in the lab, used in an on-boarding kit, etc.

Design experiments in a resource-efficient way
INYOUNG

- Discuss options for experimental design optimization
- Come up with a document that provides guidance on how to plan experiments, that can be printed as a poster in the lab, used in an on-boarding kit, etc.

Office life (fruit basket, social activities, etc.)
BLANCA

- Order a weekly fruit baskets
- Create a social committee with sustainability as one topics to be considered
- Organise a social lunch on the topic of vegetarian cooking
- Organize an apéro to discover local beer

Equipment second-hand purchase and mutualization

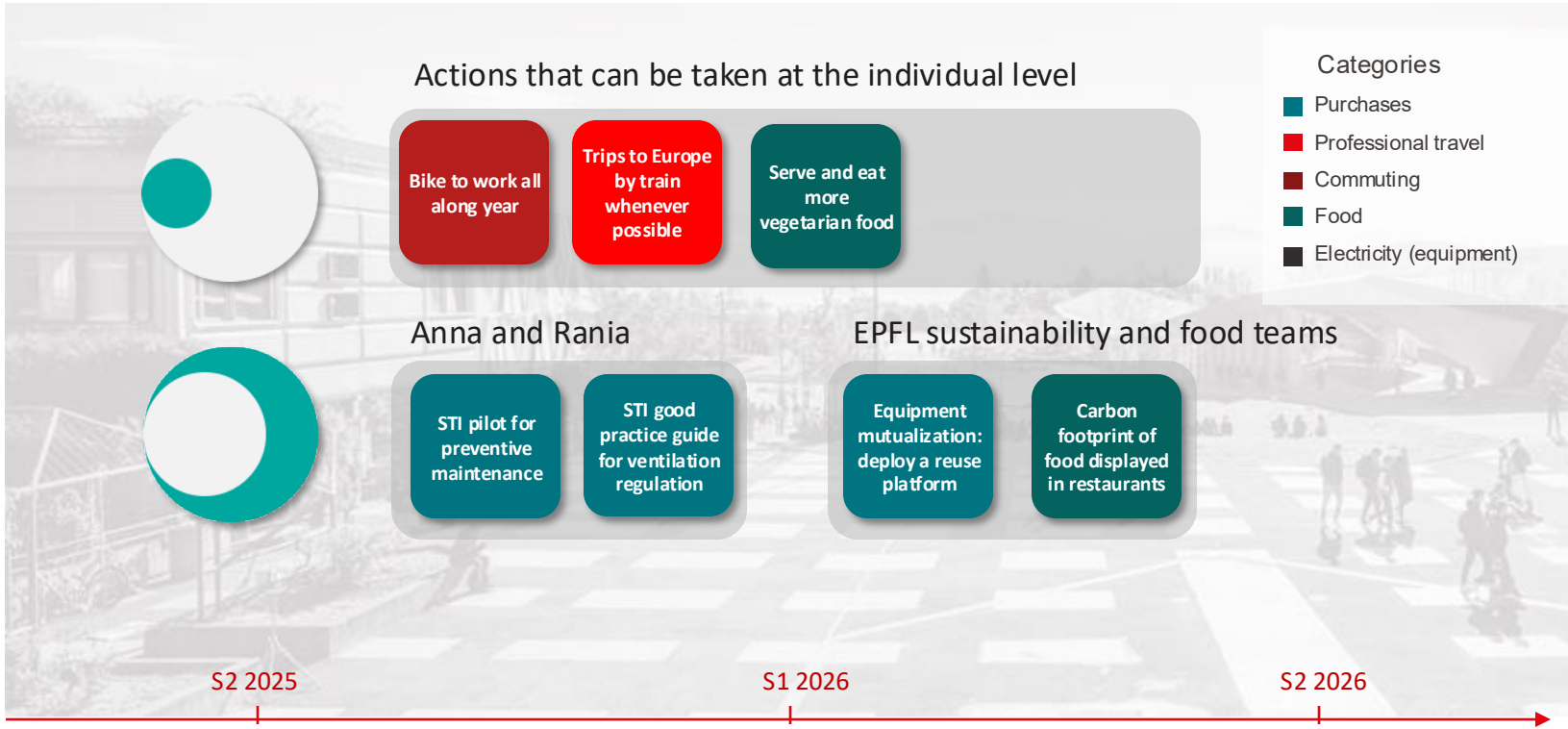
- Pilot to use the EPFL reuse platform (Anna can keep you updated when the platform is available)

Local and sustainable suppliers

- Identify top 3 products purchased
- Identify choice of supplier for each purchase
- Assess each supplier against a set of criteria, including cost, location, level of maturity in terms of environmental sustainability
- Write a short document with best practices for sustainable purchases, that can be printed as a poster in the lab, used in an on-boarding kit, etc.

S2 2025 — S1 2026 — S2 2026

Examples of actions at the individual and faculty /institution level



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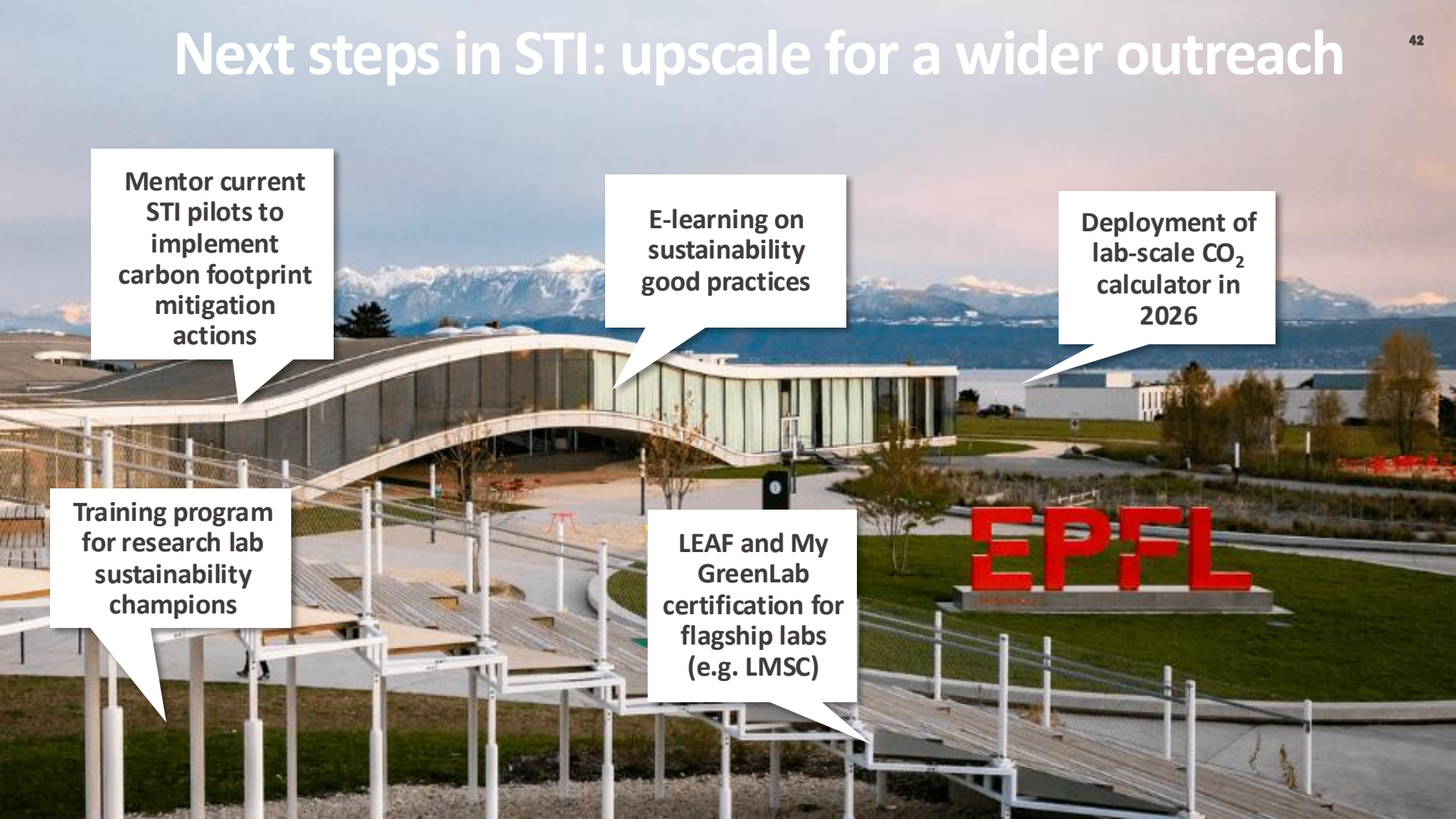
Next steps in STI: upscale for a wider outreach



Q&A

Thank you

Dr. Anna Kounina Massé

STI Sustainability Manager