

# Greener Biophore

Summary for the Dicastery Transition Ecologique & Campus and for the Centre de Compétence en Durabilité

Conversation on sustainable science



# Summary for the Dicastery Transition Ecologique & Campus and for the Centre de Compétence en Durabilité

This document contains a selection of the outcomes from the Greener Biophore initiative that we would like to bring to the attention of actors outside the Biophore perimeter. In particular, it contains the list of identified problems, the missing data and a small collection of policies proposed by participants to reduce the environmental impact of our research practices. The **identified problems and missing data** pinpoint areas where the Biophore community believes more efforts should be made, in order to conceive effective and data-driven solutions. From the diverse collection of propositions, we collected for this summary some **high-impact policies** that require institutional support, university-wide coordination, and potentially joint efforts with other academic and non-academic stakeholders. We believe that this selection reflects the efforts that part of **the community** is willing to undertake, and **asks its University for help in putting them into practice**.

# Transversal propositions

- Allow PhD students to devote part of their working time to extra-curricular activities (e.g., collecting and analyzing data, organizing initiatives...) and writing a chapter of their thesis or a publication on the topic. Negotiate with the doctoral school the possibility of giving credits for such initiatives. Extra-curricular activities: sustainability, science communication, art & science, any sort of volunteering or public good in which science or the department is at least indirectly involved.
- New hiring practices: PIs address at least qualitatively the topic of sustainability in hiring interviews. It should not be a reason for exclusion, but it could be an extra point to distinguish among two equally valuable candidates.

# Experimental research resources

- Over consumption of plastic and machines. Due to abundant funding and consumables availability, ease of access and purchase, it is common to consume more plastic items than needed, or to purchase more machines than needed.
- Lack of knowledge and awareness. Researchers often have limited knowledge of the best practices to carry out sustainable research (materials, protocols, available alternatives...). Even when aware of alternatives, some researchers stick with their regular practices due to inertia or to the 'superstition' that certain resource-intensive protocols are better than low-tech alternatives. They are generally unaware of the financial and environmental cost of consumables and machines.
- Researchers underestimate or undervalue the precious work of technical staff in the kitchen and laveries. Since they do not see the labour-intensive and resource-intensive process that is behind media/buffers/chemicals preparation, they tend to ask for more than they actually need.

- Inefficient or sub-optimal use of existing resources and their maintenance. Resources are mostly managed at the group level, thereby there is a lack of sharing of equipment and chemicals. While there is some spontaneous intra-department sharing, the inter-department sharing is basically inexistent.
- Waste and individualism. Some of the underlying values of our consumerist society are reflected in the way we approach our research: focusing mostly on ourselves and the importance of our work, and using more resources than needed, considering waste as a mere externality that someone else will take care of.
- Overconfidence about current or past efforts towards sustainability in research practices. Some researchers believe our department/building/University have already taken great steps towards sustainability, and that we do not need further efforts. In particular, they argue that most efforts from research institutions are useless if bigger polluters do not commit to reduce their emissions.
- Lack of resources for sustainability based projects. There are not enough resources (money, time, expertise...) to carry out sustainability based projects.

#### MISSING DATA

We would need:

- More detail on the **consumables category 'others' or 'mixed'**. We should change the ordering system so that only consumables belonging to the same category can be purchased in the same order. The official request could come from the CCD.
- More refined data on consumable usage at department / group level.
- Life cycle analysis (LCA) for the different consumables & machines. The data should be made easily accessible to users.

#### PROPOSED POLICIES

- The dept Directors negotiate with the FBM Decanat / Direction to have **more flexibility in the allocation of funding according to real needs**. In particular, they ask to remove or modify the rule about reallocation based on previous year expenses, that incentives spending without real need (e.g. use the 5 previous years instead).
- The dept Directors undertake or assign the mandate to negotiate with the FBM Decanat / Direction funding to use specifically for sustainability projects (e.g. hiring specialized staff, purchasing special equipment for washing reusable items).
- The 3 departments collectively agree on a rule to **prioritize sustainability**, as opposed to lower cost, **when purchasing a new machine**, and invite the FBM Decanat to recommend (or to enforce) the same policy at the faculty level.

# Computational research resources

- Lack of awareness or knowledge of the ecological cost of computing tools and of ways to diminish it.
- Practical problems. Hardware acquisition at UNIL does not consider how components are created/assembled, if it is possible to repair or upcycle parts (e.g. parts cannot be replaced to better fit higher computing needs). This leads to accumulation of old laptops due to purchases of more recent hardware even though the old equipment is still functional.

- Over-consumption of computing infrastructure (HPC cluster), data storage infrastructure, AI (in particular LLMs for research and education). Due to their large availability, ease of access, and very limited cost, it is easy to use more computational research resources than needed.
- Disincentives or lack of incentives that lead to overconsumption. In most aspects of computational research, there is no incentive for best practices, nor disincentive for worst practices. 1) UNIL lacks clear guidelines on how efficient programs should be written, and how the HPC cluster should be used, and a framework to implement such guidelines. 2) The process of archiving data on celluloid (Long Term Storage, LTS) and retrieving it from the archives is slow, thereby researchers do not archive data nor take time to do data management and rather store it. 3) Computing is very cheap with respect to other research resources (e.g. lab material), thereby it is not the first area to be considered when savings need to be made.
- Systemic problems. Research objectives do not include low/efficient resource usage, while they include abundance of research output, which is often closely tied to overuse of resources. There is a systemic pressure to run fast analyses to produce research output, without reflecting too much on the appropriateness of the approach, the efficiency of the process, and the relevance of the specific analysis. These are rather considered in retrospect, after the analysis is done.
- Research culture and personal values. 1) Replicability in science means that data is stored multiple times and at different locations (similar to samples in freezers), because the risk of data loss is considered unacceptable. 2) Standards are too high, thereby too many resources are used. For example, it is considered unacceptable for platforms (data, computing) not to be available 100% of the time. 3) Individualism: sharing hardware is considered uncomfortable, so researchers prefer having their own laptops. 4) Building green algorithms/failure-free programs is not valued morally by researchers. Researchers do not use existing offers to improve their code because time/comfort is valued more.

#### MISSING DATA

We believe a series of data and information would be necessary to have a better understanding of the problem and make informed decisions (e.g. carry out cost-benefit analyses).

- Hardware purchases: historical data should be available in each department's order list / reimbursement forms.
- Computational resources: we need more refined data about cluster usage and data storage (which kind of data, frequency of access...).
- AI: we suggest implementing a survey about the usage of AI (which models, which tasks, how frequently) in daily research practices. Also, we need better data on the environmental impact of AI (both training models and everyday usage).
- Specific needs of computational resources for research: a combination of hard data and researchers' perception should be used, to clarify whether resources are used 'just because they are available' or because they are really needed.

Such a broad investigation could be carried out by the CCD with the support of some members of the DCSR service and some computational researchers working in Biophore.

#### PROPOSED POLICIES

UNIL puts in place a coordinated strategy to create awareness about the environmental impact of research resources and how to limit it:

1. The Dicastère Transition Ecologique & Campus organizes a campaign to inform researchers about the ecological costs of computing (e.g. with conferences, posters or interactive installations)

- 2. The DCSR service implements an automatic feedback email to periodically (e.g. yearly or twice a year) inform researchers or group leaders about their usage of cluster computing or storage space (e.g. a few relevant technical numbers, the aggregated emissions over the period of time, and how it compares to previous years, to UNIL average and to the department average)
- 3. The DCSR service includes, at the end of the cluster training, a mandatory training about computational best practices, including environmentally-friendly computing (e.g. routinely using the green algorithms footprint calculator)
- 4. The DCSR carries out routine checks on particularly resource-intensive jobs, to make sure they are not over consuming resources due to inefficient code. Tension 1: Mandatory checks of building green algorithms/not using LLMs could slow research down significantly. Tension 2: do they have the capacity and the right to look into someone's jobs and codes? Would it risk being perceived as a policing state?
- UNIL should advocate for a system in which research groups share data, analyses and results, to learn from each other's processes and to avoid running the same process twice. Data, code and results could be available on the Github account of the group, which should be easily linked to the webpage of the group. Such a system should be designed in a way that ensures confidentiality and intellectual property and minimizes risk of 'scooping'.
- UNIL should lobby/take political actions to **pressure technology companies** into producing environmentally and socially friendly hardware.
- UNIL should lobby/take political actions to make **producers internalize** (pay for) the ecological cost of computing resources
- UNIL should advocate for **data deletion** after 10-15 years of its creation if considered not necessary for more research. The metadata should be stored such that if someone needs the data, they know how to re-generate it. A structured policy should be formulated by the data stewards depending on the specific need of each faculty.

# **Energy and Spaces**

- Unequal space distribution based on status. In many departments, workspace allocation is often influenced by academic status rather than functional need. Professors often have spacious offices to themselves, while students and technical staff work in crowded spaces. This creates inequality in working conditions and undermines the principle of fair access to resources.
- Desire for comfort vs. limitations of infrastructure. Most people want a comfortable and quiet working environment. However, the layout and capacity of the Biophore doesn't meet these expectations. This may be due to the building hosting more people than they were originally designed for, leading to overcrowded labs and shared spaces.
- Outdated attitudes about home office. Remote work is sometimes perceived as a sign of laziness or lack of seriousness. These attitudes discourage flexible working arrangements, even when home office can reduce energy usage, relieve pressure on physical space, and improve individual productivity.
- Preference for cutting down over replacing. Cutting down energy consumption is seen as more straightforward than replacing it with greener energy sources. When it comes to reducing energy use, there is often a tendency to simply cut access (e.g. restrict heating or limit shared equipment use) instead of exploring creative alternatives or energy-efficient upgrades. Sensitisation efforts, visual reminders, and educational signage can help shift this mindset.

• A pessimistic outlook on small actions. There is a common belief that individual or small group actions are negligible in the face of global environmental issues. This pessimism erodes motivation and delays collective efforts. Building a culture that values every action, no matter how small, can be a powerful driver of change.

#### MISSING DATA

- Lack of clarity on energy sources and usage. While UNIL has set ambitious goals for reducing energy consumption, there has been less effort toward replacing our current energy sources with more sustainable ones. We need to allocate more time, funding, and political will to understanding where our energy comes from and how much of it we use. Note from Greener Biophore organizers: information on this is available, so this is rather a lack of communication or perceived lack of information.
- Absence of disaggregated energy data in Biophore. At the Biophore building, we lack detailed information on electricity and heating consumption. Without knowing how energy is used by floor or department, it becomes difficult to identify major contributors or opportunities for reduction. Gathering floor-level data, especially since floors roughly correspond to departments, would allow for more targeted and transparent action. Note from Greener Biophore organizers: information on this is available, so this is rather a lack of communication or perceived lack of information.

#### PROPOSED POLICIES

- Encouraging trust in home office practices. Groups are encouraged to adopt policies that allow and normalize working from home when appropriate. To do so, a foundation of trust must be built, where remote work is not equated with avoidance but recognized as a valid and sometimes more efficient way of contributing.
- Sharing lab equipment and storage space. To reduce the duplication of high-energy devices (e.g. freezers, incubators...), departments should incentivize the sharing of both equipment and storage space across research groups. Not only does this reduce energy use, but it also maximizes the utility of existing resources. Tension: it is hard to attribute the cost of shared equipment, and its responsibility for maintenance.
- More motion detectors for lighting. To minimize unnecessary electricity use, motion detectors should be installed more broadly in corridors, common areas, and bathrooms. These systems have already proven effective in several buildings and could be scaled up.

# Professional mobility

- Some members of the community, particularly professors, travel frequently and often **exceed** the needs of their academic responsibilities. This leads to an unnecessarily large carbon footprint.
- In some cases, when researchers choose to **decline an invitation** to present at an international event explaining to the organizing committee that the reason is to reduce their carbon footprint, they are still asked to **recommend someone else** to take their place, which makes the researcher's decision pointless.
- Factors that prompt researchers to take a flight instead of the train include: trip cost (the plane is cheaper), trip time (they cannot afford to spend too much time travelling), time for planning the itinerary (planning a flight is less time consuming).

- Many individuals choose to continue traveling because attending international conferences brings **prestige** not only to the researcher but also to other members of their research group, and it is beneficial for building a **strong CV**.
- People who value sustainability may feel afraid of being judged by others.

#### MISSING DATA

There is an apparent inconsistency between the impact of aviation at the University and at the Biophore level, which seems to be proportionally smaller. The current method used to estimate the impact of aviation at the Biophore level consists of considering the reimbursement forms for flights. This method might not take into account certain trips such as the ones paid by other institutions, or personally paid flights. We propose to:

- Clarify if the current figures on air travel are correct or an underestimate.
- Implement a yearly survey to declare all flights and check for flights potentially not captured by the system (e.g. flights when invited elsewhere, personally paid flights, students field trip...)

This could be done by the Department Sustainability Task Force in collaboration with the CCD.

#### PROPOSED POLICIES

The following indirect measures could be implemented (at the department, building, and University level) to increase awareness about alternative solutions to air travel:

- Raise awareness of train discounts like interrail, eurorail, etc.
- Encourage an increase in the number of **virtual and hub-based conferences**, and reserve slots for virtual lectures during in-person congresses. Tension: There is a general belief that virtual conferences cannot substitute the value of face-to-face interactions and the superior networking opportunities that in-person events provide.
- Empower researchers to **respect their values** and be true to their decision to attend congresses virtually. Encourage communication between PIs and researchers to respect their decision of not traveling abroad due to climate anxiety.
- Implementing the following guideline: When forming a **PhD committee**, the PI and the student preferentially **select experts that can travel** to Lausanne **by train**, otherwise they clarify from the beginning that **attending virtually** will be highly encouraged over coming in person (at least for the 8 month and the mid-thesis evaluation).
- A platform for academics that provides tools allowing to find the **most optimal train itineraries** below 9h-long.
- Making travel payment or **reimbursement** contingent upon selecting the option with the **lowest** carbon footprint.

## Beyond research: food

- Meat contributes disproportionately to  $CO_2$  emissions. While representing only 9% of the mass of food consumed in the cafeterias, meat products contribute to more than  $\frac{1}{3}$  of the  $CO_2$  emissions linked to food.
- Substitution of meat with eggs and dairy products. The increased consumption of eggs and dairy products between 2019 and 2023 partly compensated the decrease in emissions achieved by reducing meat consumption

- Centrality of meat. For many people, meat is an irreplaceable element in a meal.
- Large availability of meat options. Many people decide not to cook their own meal, for a variety of reasons. Thereby they purchase their meals from the cafeteria, and options with meat are higher in number, making it an easier choice.
- Poor quality and excessive price of vegetarian options. The offer of vegetarian and vegan meals in the cafeterias is limited in number, excessively expensive for its content, and often not very good in terms of quality (taste and nutritiousness)
- Consuming local, organic food is not an excuse for other impacts. Often people have the perception that consuming organic or local food is sufficient to compensate for other impacts (e.g. that consuming a local organic steak is better than consuming non-local plant-based products, or that consuming local organic food offsets their emissions due to commuting by car).
- Clash with guidelines and labels (e.g. fourchette verte)

#### PROPOSED POLICIES

A series of measures could be implemented in UNIL cafeterias:

- Propose "CAP2037 meals", a series of meals with a low environmental impact. They can include a small amount of meat (e.g. chicken) as long as the total impact is lower than the threshold needed to achieve the CAP2037 objectives linked to cafeterias' food.
- Make meals with low environmental impacts cheaper than meals with high impact, and potentially subsidise low impact meals by increasing the price of high impact meals.
- Remove beef and lamb from all menus.
- Increase the number of **vegetarian days** during the week.
- Reduce the number of non-vegetarian options and increase the **number of vegetarian and vegan options**.
- Increase the number of choices and the quality (taste and nutritiousness) of vegetarian and vegan menus.
- Share vegetarian and vegan recipes with the UNIL community, to inspire them.
- Propose courses and training specialized in plant-based diets to their employees.

## Beyond research: commuting

- Cars contribute disproportionately to emissions. Even though less than 10% of the UNIL community commutes by car, the cumulative CO<sub>2</sub> emissions linked to car trips are more than half of the total.
- Differences in commuting habits between UNIL members. There are marked differences in the commuting habits of the UNIL community, depending on their status (PAT, students, PI). Measures targeted to each group might be needed to reduce the impact of commuting.
- Comfort. Commuting by car remains one of the most comfortable ways of moving (flexibility of timing, speed, independence from weather conditions, safety, avoiding cross...). It is hard for other forms of commuting to be competitive.

• Poor infrastructures for low-impact commuting. Since the infrastructures for mobility are planned and built around cars, driving remains the most practical way to move. Alternative ways of commuting (bike, scooter...) often lack enough safety in the streets, and the resulting feeling of danger is enough to discourage many people. In addition, there is very limited, if not at all, infrastructure for people with impaired mobility.

#### MISSING DATA

It would be important to know the **motivations** that lead people **to commute by car**, to know which levers to use to change commuting habits. For example, would people care if the parkings were more expensive? Or if public transport was less crowded?

#### PROPOSED POLICIES

The University could implement a series of measures to reduce the environmental impact linked to commuting:

- Coordinate with the local municipalities and the city of Lausanne to create **more bike lanes** around UNIL, to increase safety and comfort of people commuting by bike.
- Provide financial help for public transport (e.g. subsidise the half-fare card) or electric bikes, or implement week trial periods for people that want to test an alternative way of commuting before committing to it (e.g. 1 week of public transport subscription).
- Promote **car sharing** among UNIL employees, for example by implementing an app, or making parking slots cheaper for people that do car sharing.
- Reduce the number of parking slots, and increase their price. Tension: this might negatively impact families or people that have no other option than commuting by car (for socio-economical, geographical or health reasons)
- Propose cheaper **parking subscription** that ensures access to parking slots **for 4 days per week**, to encourage home office or low impact commuting on at least 1 day per week. Or, implement **a cashback system** that rewards users for each parking day not used.
- Install e-bike charging stations in all buildings.
- Implement initiatives to **make low-impact commuting fun**, along the lines of the 'bike to work' initiative (friendly challenges, prize draw, events...)
- Implement a system of **shuttles** between UNIL and the main train stations (Lausanne and Renens)

