



Centre for
Organismal
Studies
Heidelberg

Green Guide

Practices for Sustainable Laboratories



COS Goes Green 2026

The Vision

Scientific research is essential for technological and medical progress, yet it also has significant environmental impacts. High energy consumption, plastic waste, and chemical emissions contribute to environmental degradation.

With the '**Green Guide**' the **COS Goes Green Team** aims to help researchers adopt more sustainable practices—in the laboratory, at events, and in everyday life.

Our sustainability mission¹ reflects a firm commitment to protecting the rich biodiversity of our environment. Through responsible research practices, we actively contribute to the State of Baden-Württemberg's ambition to achieve climate neutrality by 2040, securing a resilient and sustainable future for generations to come.

This guide aims to

- 🌿 **Raise awareness** and establish clear sustainability standards at COS.
- 🌿 **Facilitate exchange** of best practice examples.
- 🌿 **Motivate research groups** to continuously improve.
- 🌿 **Embed sustainability** as a cornerstone of scientific excellence.

The guide is divided into two parts for easy implementation in daily lab work:

1. Standard Lab Practice

Actions that should become routine and be included in onboarding for new members.

2. Sustainability Recommendations

Longer-term measures that require team discussion, periodic sustainability reviews, and strategic planning.

¹ <https://www.cos.uni-heidelberg.de/en/centre-for-organismal-studies-heidelberg/sustainability-at-cos>

Improving Energy Efficiency

Laboratories are among the most energy- and resource-intensive environments in research institutions. A large part of energy consumption is caused by ventilation and air conditioning, followed by large lab equipment (freezers and microscopes) and other devices. Simple, conscious actions can therefore generate substantial savings.

Standard Lab Practice



- 🌿 **Adjust equipment settings:** Set ultra-low temperature freezers to -70°C (instead of -80°C) This can cut energy use by up to 30 %. Perform regular inventories, minimize the number of storage boxes, share freezer space across groups, defrost freezers regularly, and clean filters.
- 🌿 **Close fume-hood sashes** whenever the hood is not in use: Saves up to 60 % of the energy used for air exchange.
- 🌿 **Turn off all lights** when you are the last to leave the lab.
- 🌿 **Put computers and monitors** in sleep mode or turn them off when not in use.
- 🌿 **Limit autoclave cycles:** Segregate GMO from non-GMO waste and sterilise labware only when necessary. Many plastic consumables arrive sterile and nucleic-acid-free; additional autoclaving is often redundant.
- 🌿 **Share instruments:** Use centrifuges, incubators, PCR machines, etc. collaboratively across teams.
- 🌿 **Use ACT²/ENERGY STAR³-certified devices** for IT and lab equipment.
- 🌿 **Use switchable plugs** and clearly label instruments that can be switched off after use. Printable stickers are provided here ⁴.
- 🌿 **Prefer laptops or mini-PCs over desktops** where possible — they consume 50–80% less power.
- 🌿 **Schedule regular maintenance:** Well-maintained equipment runs more efficiently and lasts longer.
- 🌿 **Donate functional equipment** to other research groups or educational institutions (e.g., schools).
- 🌿 **Trim (data) storage needs:** regularly check your fridge and freezer content and your digital archives to minimize unnecessary storage.

² <https://actdatabase.mygreenlab.org>

³ <https://www.energystar.gov/productfinder>

⁴ <https://heibox.uni-heidelberg.de/d/1234a4187ada46e39087/>

Sustainability Recommendations

-  **Use heating blocks instead of water baths** for bacterial heat shock and similar procedures. They achieve the same result while using only ~5 % of the energy.
-  **Consider DNA storage at RT** using available commercial solutions or standardized protocols ⁵.

⁵ <https://300k.bio/wp-content/uploads/2022/11/DNA-Preservation-and-Storage-at-Room-Temperature-.pdf>

Improving Waste Management

Laboratories generate large volumes of waste from chemicals, consumables, and single-use materials. By adopting conscious practices and improved waste separation we can reduce the amount of waste and its associated environmental impact.

Standard Lab Practice

- 🌿 **Separate waste correctly:** label recycling and hazardous waste bins clearly. In INF230, containers for paper/cardboard, packaging/plastic waste, and residual waste are on each floor and outside the building; In INF360 they are located at the building entrance. Additional waste paper bins are in offices and labs; biological and electronic waste bins are in the basement.
- 🌿 **Use the Recycling Point** at the COS reception (in INF230) for PET media bottles (Pan-Biotech collection box), used batteries, printer cartridges and computer accessories (Office Mix collection box). NEB ice packs can be returned with the pre-attached sticker the cooled goods packing list.
- 🌿 **Collect glass waste** in designated containers. In INF230, laboratory glass can be mixed with other glass streams.
- 🌿 **Replace hazardous chemicals** (e.g., ethidium bromide) with greener alternatives whenever possible.
- 🌿 **Minimise printing:** when printing is unavoidable, use double-sided mode and eco-friendly paper. Store protocols digitally (e-Lab FTW, digital lab notebooks).

Sustainability Recommendations









- 🌿 **Reuse styrofoam containers** for shipping and storage.
- 🌿 **Plan your experiments thoroughly** before starting and apply micro-scale reaction volumes where feasible. This cuts chemical consumption and avoids unnecessary repeats.
- 🌿 **Reduce general lab waste** (gloves, single-use plastics) through mindful use.
- 🌿 **Opt-out of junk mail** in your mailbox(es) and the associated carbon footprint by registering on the *Robinson List*⁶ and unsubscribing from printed catalogues.

⁶ <https://www.robinsonliste.de>




Optimizing Consumables and Procurement

Consumables dominate both laboratory budgets and environmental footprints. Smarter purchasing and usage can cut waste and costs simultaneously.

Standard Lab Practice

-  **Choose reusable alternatives:** favour glass over disposable plastic when feasible. Life-cycle analyses show that the higher production impact of glass is outweighed by avoiding repeated plastic manufacture, transport, and disposal ⁷.
-  **Implement digital tracking:** use inventory software or spreadsheets to monitor ordering patterns and expiry dates.
-  **Order in bulk:** reduces packaging waste and transportation emissions.
-  **Look for ACT labels** ⁸: ACT-certified products provide transparent sustainability ratings. Check for products showcased as sustainable at the ZNF-Shop.
-  **Order lyophilised oligos, antibodies, peptides** when possible: it saves shipping weight, package material and is more stable.
-  **Switch to master mixes:** fewer tubes, less plastic, and improved reproducibility.
-  **Use concentrated stock solutions:** dilute on demand to reduce bottle turnover.
-  **Reduce water consumption:** install water-saving devices on faucets. Maximize dishwasher/autoclave loads. Use deionized or ultrapure water only when essential.

Sustainability Recommendations

-  **Collaborate on innovation:** encourage suppliers to develop low-waste or refillable product lines.
-  **Opt for “eco” products:** some suppliers offer low-packaging or recyclable alternatives.
-  **Buy from sustainable suppliers:** prefer vendors offering recycled materials or take-back schemes.

⁷ <https://sheffield.ac.uk/sustainability/news/case-study-washing-and-reusing-labware-more-sustainable-research>

⁸ <https://actdatabase.mygreenlab.org/>

Communication and Community

Effective communication and a strong sense of community are essential for embedding sustainability into everyday lab culture. By sharing knowledge, coordinating efforts, and fostering collaboration, laboratories can amplify impact and drive meaningful change.

Standard Lab Practice

- 🌿 **Sustainability onboarding:** include a brief sustainability module in every new-member orientation.
- 🌿 **Training:** provide quick guides on sustainable behavior, ordering, disposal, and reuse.
- 🌿 **Use behavioural nudges:** posters, labels, stickers, and reminders to keep sustainability top of mind⁹.

Sustainability Recommendations

- 🌿 **Green champions:** appoint sustainability representatives in each lab or floor.
- 🌿 **Feedback loops:** share results with the team to encourage continued improvement.
- 🌿 **Create a “Green Catalog”:** Identify preferred eco-products for common consumables.
- 🌿 **Get your medal:** Join green certification programs such as “My Green Lab”. This will not only motivate your group to engage in sustainability efforts, but also provide an important asset for grant applications.
- 🌿 **Join the COS Goes Green initiative:** this guide and many other ‘green’ activities wouldn’t have been possible without engaged COS members who contribute in small and big ways alike. Reach out on Mattermost to the COS Goes Green Team and become part of the movement.

⁹ <https://heibox.uni-heidelberg.de/d/1234a4187ada46e39087/>

Sustainability in Meetings, Travel, Transportation

Scientific exchange has a vital role in our research. Integrating sustainability into scientific exchange helps reduce emissions, conserve resources, and model the environmental responsibility expected from the research community.

Standard Lab Practice

- 🌿 **Reduce travel:** use virtual or hybrid formats for conferences and seminars to limit long-distance flights. Air travel causes disproportionately high carbon emissions^{10,11}. In 2023, recommendations were made for "anchoring the concept of sustainability in DFG funding activities" with "reflection of travel activity" on top of the list¹².
- 🌿 **Sustainable travel choices:** when travel is essential, prioritize trains or shared transport, try to coordinate multiple collaborations in a single trip.
- 🌿 **Organize car-sharing** to locations hard to reach with public transport.

Sustainability Recommendations

- 🌿 **Promote sustainable practices** at events: minimize single-use plastics, use compostable or reusable supplies, local and seasonal products for catering.
- 🌿 **Encourage digital handouts, programs, and posters** rather than printed materials.
- 🌿 **When travelling to work follow this priority list:** bike>public transport>shared car. COS offers a shower and changing facility at the INF230 basement.
- 🌿 **Support flexible work arrangements**, including remote work, to reduce daily commuting emissions.

¹⁰ <https://flyingless.de>

¹¹ https://uba.co2-rechner.de/de_DE/mobility-flight#panel-calc

¹² https://www.dfg.de/download/pdf/dfg_sustainability/recommendations_2023.pdf

Credits

Concept and design: Benedikt Dürr, Eva Hasel de Carvalho, Suat Özbek.

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