



Greening up your labs

ASTMH Green Task Force

Environmental footprint of labs



Labs use 4x as much water as office spaces of the same size.



Labs typically use 40-60% of campus energy use but only take up 5-20% of the total space.



Labs use up to 10x as much electricity as comparable office or commercial spaces.



Labs produce 12 billion pounds of plastic waste per year (weighing the equivalent of 67 cruise ships).

Goals for today



Resource Savings

- Save energy and water
- Reduce waste
- Reduce greenhouse gas emissions



Innovation

- Explore new processes, technologies, methods and ideas.



Change in Mindset

- Build a culture of lab sustainability
- Rethink how things have always been done



Collaboration

- Familiarize yourself with resources and toolkits
- Work with your colleagues and institution
- Provide a model for other labs

Areas of concern

Waste & water



Energy consumption



Hazardous pollution



Tips for reducing waste and water use

Reduce, reuse, recycle



75% of plastic lab waste is from tip boxes.

Adjust water flow

- Control water flow with timers and automatic shut-off valves.

Manage inventory

- Set up inventory procedures to allow for improved resource management.
- Share equipment and supplies when possible.

Tips for reducing energy use

Freezers

- Set ultra-low freezers to -70°C instead of -80°C . This can save up to 40% energy and most samples can be safely stored at this temperature.
- Keep freezers clear of ice build-up, dispose outdated samples, and maintain freezer inventories to save space/time looking for samples.
- Keep freezer filters and coils clean and free of obstructions.

Fume hoods

- Close variable speed fume hoods when not in use.
- Hibernate unused or unneeded fume hoods.

Equipment

- Consider green alternatives when replacing or upgrading equipment. This can improve energy efficiency by $>70\%$.
- Unplug instruments when not in use.



An average -80°C freezer consumes as much energy as a single-family home every day.



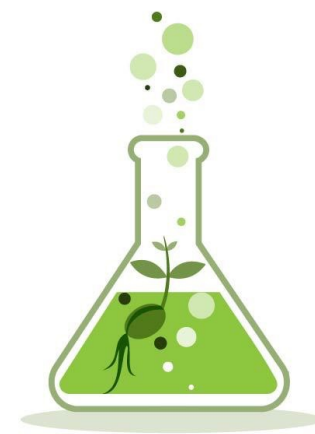
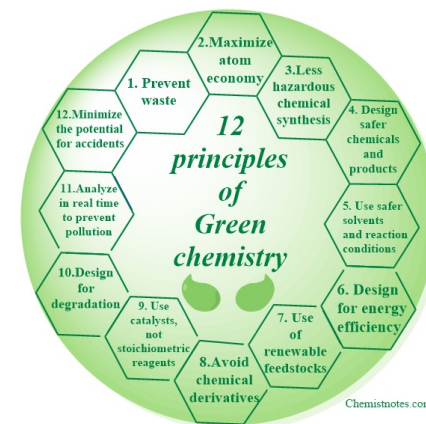
Each fume hood can use as much power as 3.5 average American homes in a year.



Cutting the “phantom load” from appliances not in use (but still draw power) can cut 10% of the total lab energy use.

Tips for reducing hazardous pollution

- **Manage inventory** to avoid expirations.
- Substitute hazardous cleaning and sterilizing substances with non-hazardous ones.
- Follow proper waste disposal procedures.
- Use sustainable refrigerants/coolants when possible.
- **Share resources** when possible to avoid unnecessary purchases.
- **Minimize shipments** of both supplies and samples (refer to field team presentation!)



Learn about green chemistry!
<https://www.epa.gov/greenchemistry>

Tips for your institutions



- Share leftover chemicals, equipment and materials through a campus-wide **recycling and reuse initiative**.
- Participate in (or advocate for) **lab certification** programs.
- Incentivize sustainable cold storage and energy practices (i.e. **Freezer Challenge, Shut the Sash Challenge**)
- Share freezers and liquid nitrogen tanks. Offer “**floating freezers**” across campus for defrosting.

Catalyzing cultural & institutional changes

- Assign a **Green Team Leader** for your lab.
- Partner with other labs to **spread the uptake** of green practices.
- Establish time during lab meetings to **assess opportunities** to improve sustainable practices.
- Help **measure** the carbon footprint and carbon literacy of your workplace.
- Include sustainability roles/responsibilities in job descriptions.
- Engage institutional leadership for a **carbon-zero commitment** and plan.

Some additional incentives

- Energy-efficient and environmentally sustainable lab practices can be a smart way for researchers to make their **grants stand out**.
- Save on **indirect and direct costs** for energy, water and supplies.
 - One lab could **reduce energy use by 8%** and **save \$2,500 + 13 tons of CO₂** annually with just three actions: 1) reducing freezer temps to -70°C, 2) replacing overhead lights with LED bulbs, and 3) turning off one fume cupboard.



Revisited goals for today



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Helpful resources

- Your campus sustainability office
- **International Institute for Sustainable Laboratories (I2SL)**
- **My Green Lab**
- Certification programs, e.g. MIT, Lab Energy Assessment Center
- LabConscious blog
- <https://labos1point5.org/> : a helpful resource for **Francophone** folks
- GreenLabs Recycling: a lab recycling program in the Boston area
- Rheaply: an online platform where scientists can buy, sell, trade or donate surplus labware and supplies

Discussion

- During this presentation we covered common areas of concern and made some generic suggestions. We are interested in knowing **your opinion** and hearing **specific examples**.
- Share with us challenges that are specific to your lab, as well as **barriers and solutions you have experienced** or found in trying to remedy them.
- Talk to us about how these practices, challenges, and tips are or are not **applicable/practical** to your labs in the Global North and South. What are the **equity considerations** that we should all be aware of?