Lab Equipment Guidance

Introduction

Scientific research at Cambridge is far reaching in terms of its environmental and social impact*. Nonetheless, it is also locally accountable for significant environmental impacts, for instance due to high energy demands, or the production of large amounts of hazardous waste. Whilst both the waste produced and energy used may be unavoidable in terms of achieving the research aim - the Green Labs programme at Cambridge seeks to reduce the environmental impact of research where possible.

Plug-in lab equipment can account for a significant amount of energy consumption that may be easily reduced.

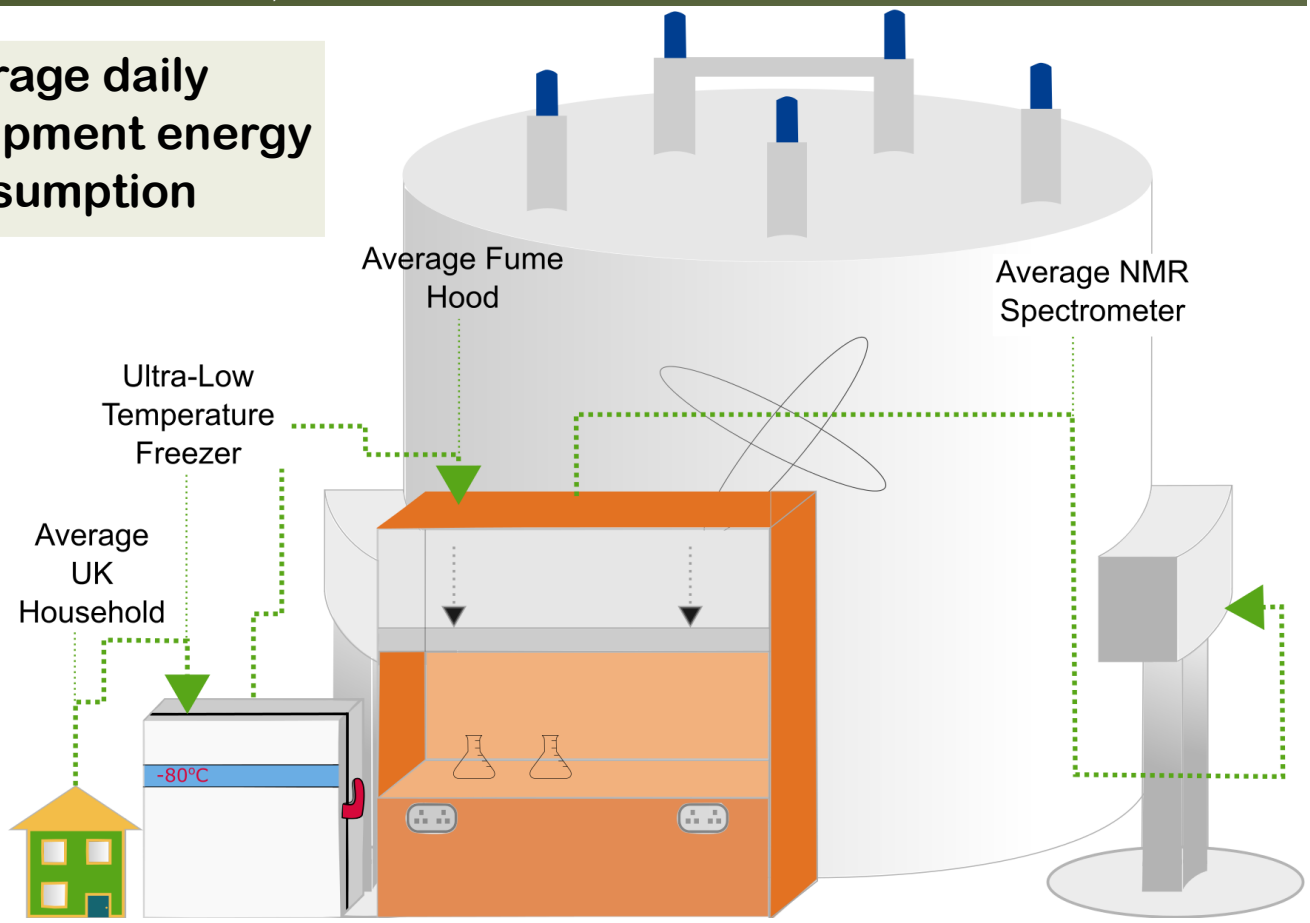
In this document...

For futher guidance and information go to:

environment.admin.cam.ac.uk/green-labs

*Research Excellence Framework; results.ref.ac.uk

Average daily equipment energy consumption



Area of equpment drawing proportional to average daily energy consumption, based on Ofgem data (for average UK household) and S-Lab data for lab eqiupment: http://bit.ly/29Pt21q

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1 Look after your ultra low temperature freezers

Problem

Ultra-Low Temperature Freezers (ULT Freezers) typically operate between -70 and -80°C, consuming between 16-22KWh[1] of electricity per day, roughly twice the consumption of an average U.K household (9KWh/day[2]). They are, therefore, some of the single most energy intensive pieces of general laboratory equipment.

Solution

Replace freezers older than 10 years with support from our freezer replacement programme. Consider moving samples into centralised cold storage. Regularly maintain your freezer; see freezer maintenance guide for more information *environment.admin.cam.ac.uk/resource-bank/guidance-documents*

Safe-guard your samples & make your freezer last longer:

1. **Routinely remove ice build up**
2. **Let your freezer 'breathe'**
   -Check the filters are clean
   -Position your freezer with at least 1.5cm of space around, behind and above it
   -Avoid storing anything directly around or on top of your freezer
3. **Keep an inventory**
4. **Clear out and defrost regularly**
5. **Replace units older than 10 years through our equipment replacement prgramme**

environment.admin.cam.ac.uk/equipment-replacement-programme

2 Replace old drying cabinets - save £300 per year

Problem

Glass drying cabinets are typically the same design as cafe pie, or fish and chip shop dislays. The technology has not advanced in a significant number of years. Glassware drying cabinets are typically uninsulated, without proper thermostatic control and are operated 24/7.

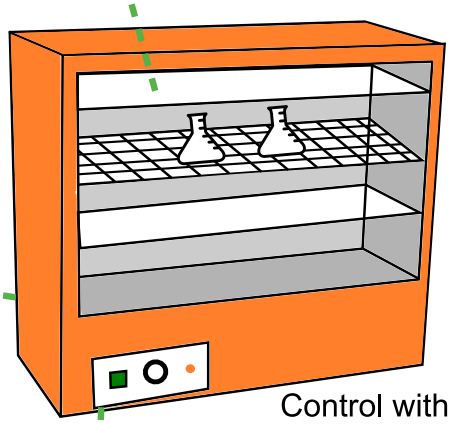
Solution

Some manufacturers are now addressing the problem of energy efficiency in glass drying cabinets. The Department of Chemisty, in partnership with Genlab, have developed and tested the new Genlab E3 model. This trial has shown that an energy reduction of around **50% (equivalent to c.£300 annually per unit)**[3] can be achieved. This has been achieved through insulation, thermostatic control, timers and better air circulation.

Top tips

Make sure cabinet is at full capacity before use

Buy an insulated energy efficient model



Control with timer and the thermostat to use for the requisite time

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[1]e.g. *Analysis of Power Consumption of -80 C Freezers in the Pathology Department and Implications for Replacement Timescales*, C. Cundy (2015)
[2]*Ofgem Report - Typical Domestic Energy Consumption Figures* (2011) https://www.ofgem.gov.uk/ofgem-publications/76112/domestic-energy-consump-fig-fs.pdf
[3]**Ana Bellenguer** (pers comm.), University of Cambridge Department of Chemistry

3 Focus on LED lighting

Problem

Light sources are needed in numerous of areas of research, including plant growth and microscopy. Growth rooms, for example, create specific conditions necessary for plant growth; the humidity, light intensity and period, temperature and composition of the air are all carefully regulated. The lighting is predominantly fluorescent and may be left on in for long periods of time in order to simulate certain growing conditions. Algal incubator shakers have also incorporated (often fluorescent) lights in order to simulate growth conditions.

Read more in this case study:
environment.admin.cam.ac.uk/leds-in-plant-growth

Solution

There is a large potential to make significant energy savings by replacing fluorescent lighting with efficient light emitting diodes (LEDs). For example, since 2012, the Department of Plant Sciences has been developing LED lighting capable of growing a wide range of plant species under controlled conditions for both research and teaching. Following extensive trials with a variety of lighting array types, plant species and metrics, lighting refits of plant growth chambers have begun. So far, with a monitored reduction of approximately **98,000kWh**, the department estimates that a saving of **£12,000** has been made on their electricity bill each year.[1]

4 Lab equipment sharing and disposal

Problem

The full life cycle of a piece of lab equipment is not often considered in research. With a given grant, the best value for money is often sought and, provided the equipment does what is required, no further thought is given. With increasing funding cuts to Research Councils greater efficiency is now required in research, and the move to whole life costings is occuring.

Solution

A prime example of the step towards improved efficiency in the use of lab equipment is the **Equipment Sharing Project**[2]. This was set up as a direct response to changes in the way that equipment on research grants is funded through Research Councils: Universities must now check if there is an opportunity to share equipment with internal departments and other institutions prior to submission of grant applications. Not only does this project improve the environmental sustainability of research but also exists to support and facilitate collaboration.

Improve efficiency in the use of lab equipment:

1. Re-evaluate - Do you need that piece equipment? Can you borrow or share? See the Equipment Sharing Project
   - equipment.admin.cam.ac.uk
2. Reuse and Recycle items on WARPit
   - warp-it.co.uk/cambridgeuni
3. Dispose of electrical waste through the electrical and electronic waste (WEEE) Scheme
   - environment.admin.cam.ac.uk/electrical-and-electronic-waste
4. Extend lifetime by maintaining items
5. Make smart purchasing decisions; consider life time costings, energy efficiency and avoiding surpluses.

[1]Martin Howes, Energy Co-ordinator, Department of Plant Sciences (martin.howes@plantsci.cam.ac.uk)
[2]Dr Christopher Wilkinson, The Equipment Project Manager

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5 Shut the Sash!

Problem

Fume cupboards are used intensively in some research areas. The Department of Chemistry alone has around 386 units. These localised fume extraction systems are fitted into scientific and medical laboratories to protect individuals from harmful substances that could otherwise be inhaled. The existing airflow control system is aimed at controlling the airflow into and out of laboratories. However, they are also energy-intensive pieces of equipment with significant associated carbon emissions. Effective use of 'variable air volume' fume cupboards uses less energy because the air removed from the building is lessened when the sash is lowered. Leaving sashes open or open more widely than necessary means that air from the lab is expelled from the building unnecessarily. One analogy is that this is like heating your house, opening the windows, and running a fan to blow the heated air out.

The University is losing up to **£225,000** a year because people are leaving their fume cupboards open when not in use.

Solution

The solution is relatively simple - close the sash when not in use. Spot checks should be run to check that sashes are closed over night. Where safe to do so, you could consider switching off fume hoods overnight.

Request or download posters and stickers to run your own '***Shut the Sash***' campaign:

environment.admin.cam.ac.uk/resource-bank/posters-materials

6 Got your own idea?

Funding is available to support energy efficiency improvements and carbon reduction initiatives in existing University buildings through the **Energy and Carbon Reduction Project (ECRP).** Initiatives that are eligible for ECRP funding include lighting upgrades and controls; improvements to heating and cooling systems and their controls; staff engagement and behavioural change programmes; and more innovative or bespoke solutions for specific pieces of research-related equipment. A simple application form is available for requests for ECRP funding. Applications are assessed against criteria such as cost effectiveness and carbon savings. Informal advice is available for those considering an application.

If you have a project idea in mind, please read through the guidance notes and information on our webpage:

environment.admin.cam.ac.uk/ecrp

Greel Labs Equipment Guidance
Christina Larkin, July 2016

Enivronment and Energy
Estate Management
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Any questions? Email:
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