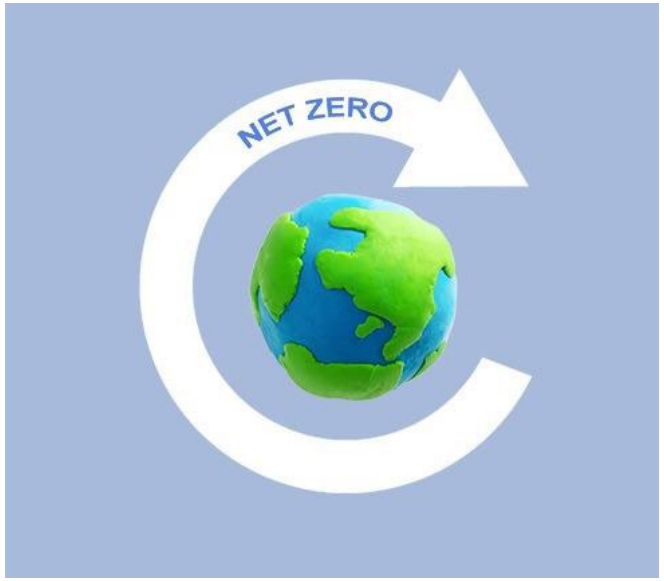
What does Net-Zero in Science look like?

Martin Farley – Sustainable Research Manager, UCL

12.10.22



2050 – UK net zero

News story

UK becomes first major economy to pass net zero emissions law

New target will require the UK to bring all greenhouse gas emissions to net zero by 2050.

Published 27 June 2019

From: Department for Business, Energy & Industrial Strategy and The Rt Hon Chris Skidmore MP

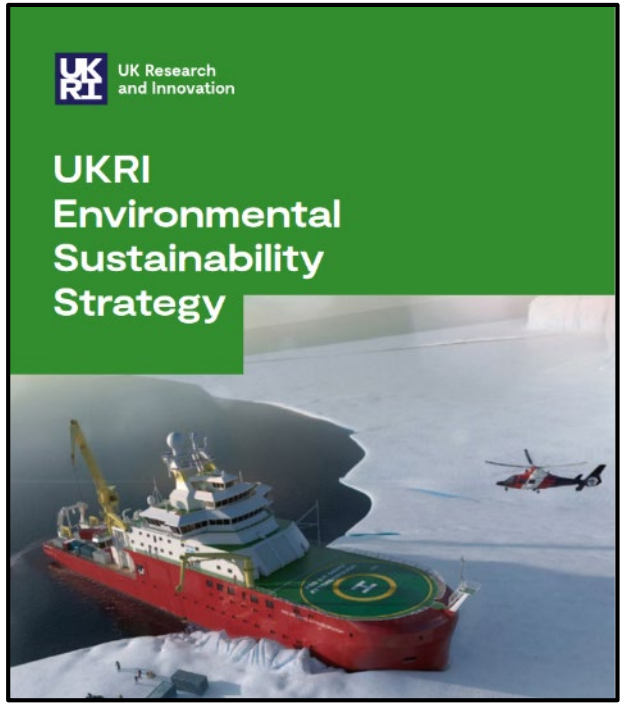
Press release

Third of UK's biggest companies commit to net zero

30 of the UK's FTSE100 companies have signed up to the United Nation's Race to Zero campaign.

From: Department for Business, Energy & Industrial Strategy and The Rt Hon Kwasi Kwarteng MP

Published 30 March 2021



NERC SCIENCE OF THE ENVIRONMENT

2040 – UKRI net zero

2030 – UCL net zero

OUR HEADLINE COMMITMENTS FOR 2024:

1. Every student will have the opportunity to study and be involved in sustainability
2. We will increase our sustainability research, with increased focus on the Sustainable Development Goals
3. Our buildings will be net zero carbon, and by 2030 our institution will be net zero carbon
4. Be a single-use-plastic free campus
5. Reduce waste per person by 20%
6. Create 10,000m² of more biodiverse green space on campus

EAUC Lists Targets

eauc The Alliance for Sustainability Leadership in Education

ABOUT JOIN ENGAGE CONTACT

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Sustainability Commitments

What are your institution's sustainability commitments?

Universities and colleges are working hard towards incredibly ambitious carbon reduction targets, and LA
that will contribute at showing the impact and leadership of the sector on this crucial agenda. The UK gov
Green House Gas emissions by 2050 under the 2008 Climate Change Act - the sector needs to meet thi

We are leading the sector in developing a response to the Climate Crisis by developing a Climate Emerg
achieve your climate targets.

Here are some ways your institution can show their sustainability commitments.

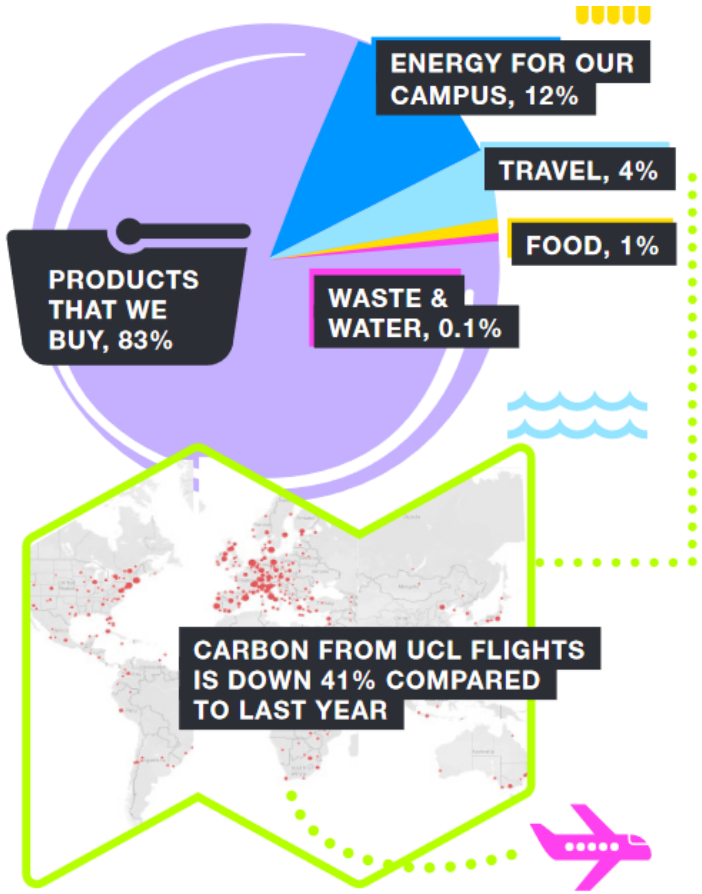
So what does this look like for Science?

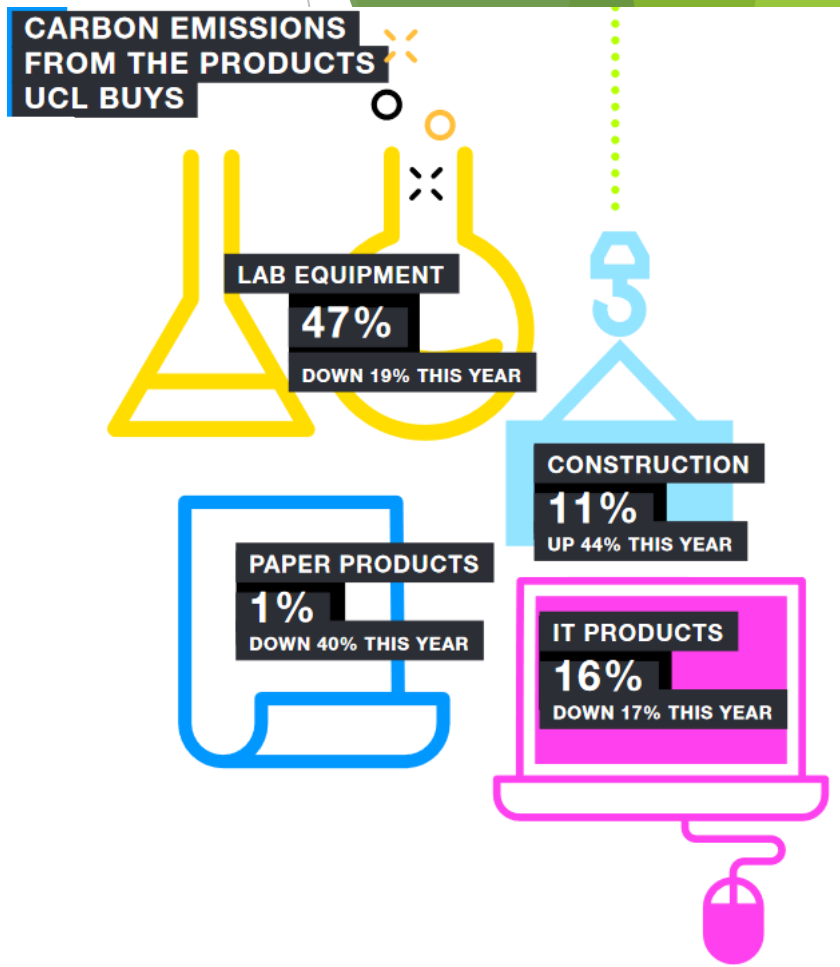
Scopes of Carbon and the future

The yellow card has displayed

Impacts of Science - Life Cycle Analysis

- Would not promote the replacement of functional models for efficient versions… Why? Because of Embodied Carbon
- Much data on impacts of science skip this crucial aspect
- Lot's 'green' initiatives are unsubstantiated, and driven by marketing





2019-20 UCL Sustainability Report

Laboratory Buildings

- Net-zero labs have been built, e.g. GSK building at Nottingham, or UCL's Pearl building

UNIVERSITY OF LIVERPOOL

£1.3M to develop the Low Carbon Chemistry Lab of the Future

The University's **Materials Innovation Factory** has been awarded £1.3 million funding from Research England to develop the **Low Carbon Chemistry Lab of the Future** to make its research more environmentally sustainable and help address the net zero target.

Department of Chemical Engineering

About us | Courses | Research | People | News and events | Discovery Space | Staff and student intranet | Health and safety

Research

- Research themes
- Research centres and institutes
- Academic research groups
- PhD opportunities
- Postdoctoral researchers
- Research facilities and services
- 2022 Net-Zero Laboratory

Home / Faculty of Engineering / Departments, institutes and centres / Department of Chemical Engineering / Research / 2022 Net-Zero Laboratory

2022 Net-Zero Laboratory

Vision

We are launching world-class facilities to undertake research in field of transition to zero pollution. We are entering a golden age of chemical engineering and this new lab will help us achieve our ambitions in net-zero, for the greater good of society.

Context

One of the first actions from Imperial's recent Academic Strategy was to launch last month a transformational cross-disciplinary programme in research, education, and innovation that will help society: 'Transition to Zero Pollution' (TZP). This initiative brings together researchers from across

Conferences & Travel

'PALS No-Fly Zone' Launches

7 January 2022

We are thrilled to announce that from 1st January 2022, PALS launched the 'PALS No-Fly Zone' initiative - where we no longer support air travel within mainland UK and Eurostar destinations (Paris, Brussels, Amsterdam)

From 1st January 2022, PALS will no longer fund academic air travel within mainland UK or nearby Eurostar destinations. Rather all travel must be by rail or other sustainable means. This applies to travel funded by PALS for its staff and students as well as visitors.

Conference Hub Model

Suppliers & Manufacturers

Your Custom Polyurethane Moulding Supplier

Managing Director – Alan Rance
https://www.midaspattern.co.uk/green-initiative

'Process Carbon Neutral' since July 2020

100%	100%	650	Zero
LED Lighting	Recyclable Packaging	Solar Panels	Landfill

Carbon Neutral Certified and from January 2021, MIDAS to Mitigate ALL Embodied Carbon

CLIMATE FOOTPRINT DECLARATIONS

The food industry generates about 25% of the world's total human-created climate impact.* That's about twice the amount of greenhouse gas emissions as all global transportation

Net Zero Mass Spectrometer enables Scientists to Work Sustainably

07.10.2021 | Editor: Doris Popp

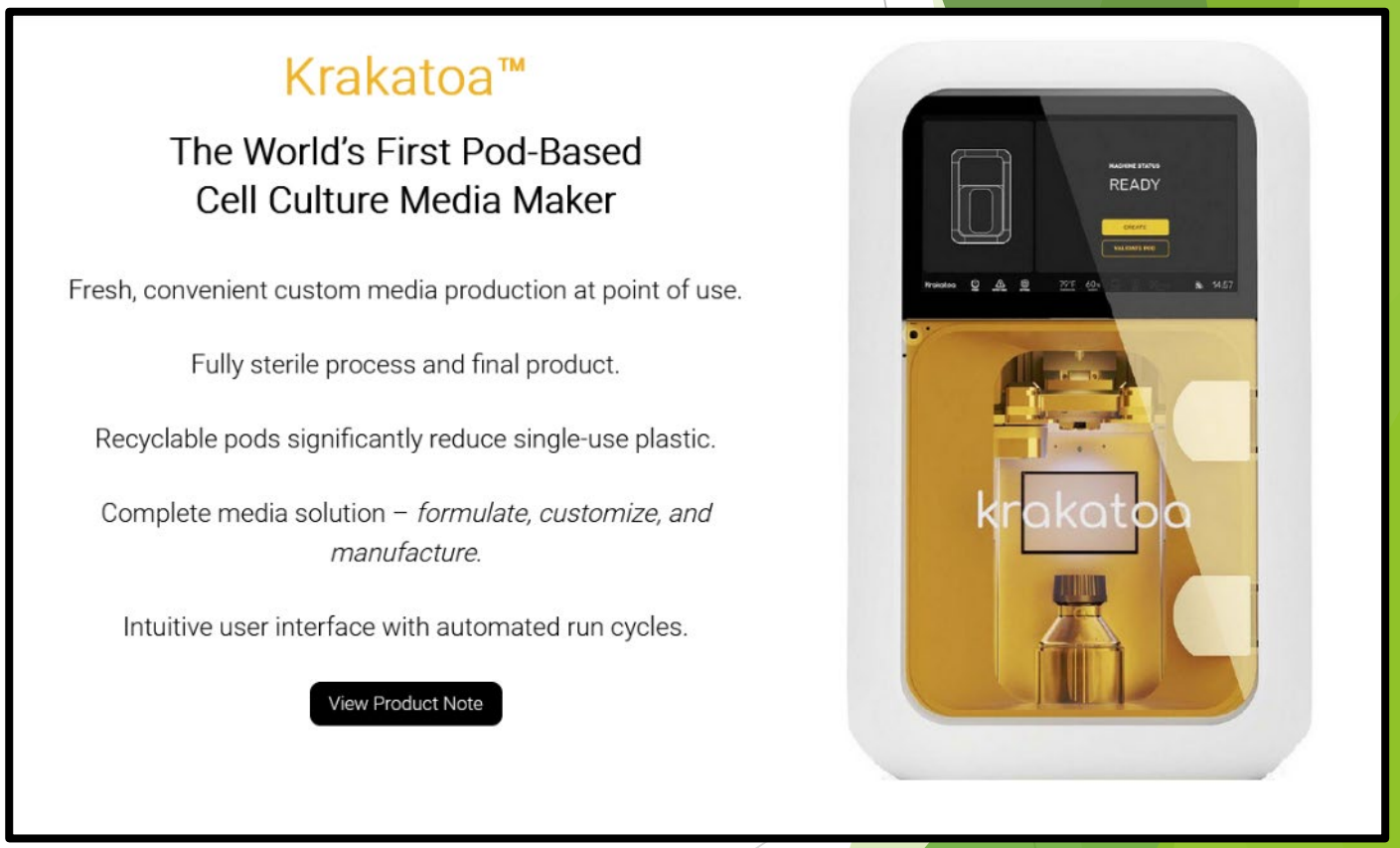
The Thermo Scientific Delta Q Isotope Ratio Mass Spectrometer (IRMS) is a next generation gas IRMS designed to enable detailed analysis with greater precision and accuracy.

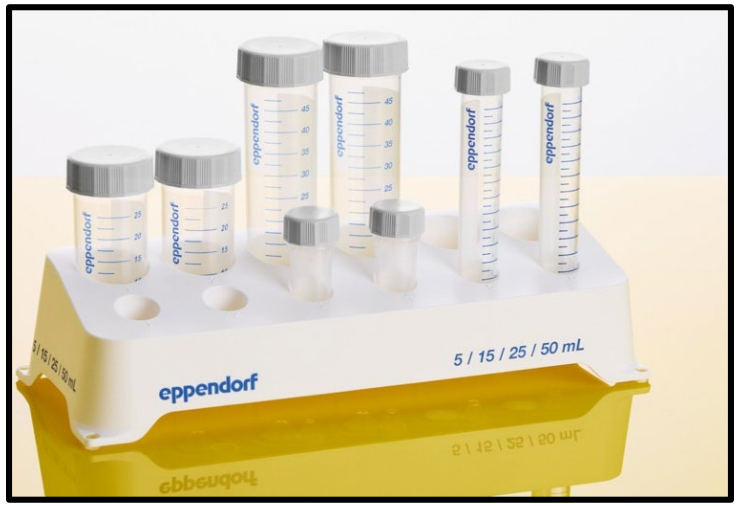
The Thermo Scientific Delta Q Isotope Ratio Mass Spectrometer (IRMS).
(Source: Thermo Fisher Scientific)

In addition to its improved specifications, including an upgrade in software to Qtegra ISDS to improve ease-of-use and laboratory productivity, the system's carbon footprint will be neutralized, allowing scientists to carry out their work, while minimizing their environmental impact. The Delta Q IRMS is the first product to be released as part of the IsoFootprint campaign, an initiative to permanently remove CO_2 emissions associated with the manufacture and supply chain of all new inorganic IRMS products. The Inorganic MS (IOMS) team at Thermo Fisher has committed to removing all embodied carbon in its new instrumentation, using technologies, like direct air capture and bio-oil sequestration, that lock away carbon from

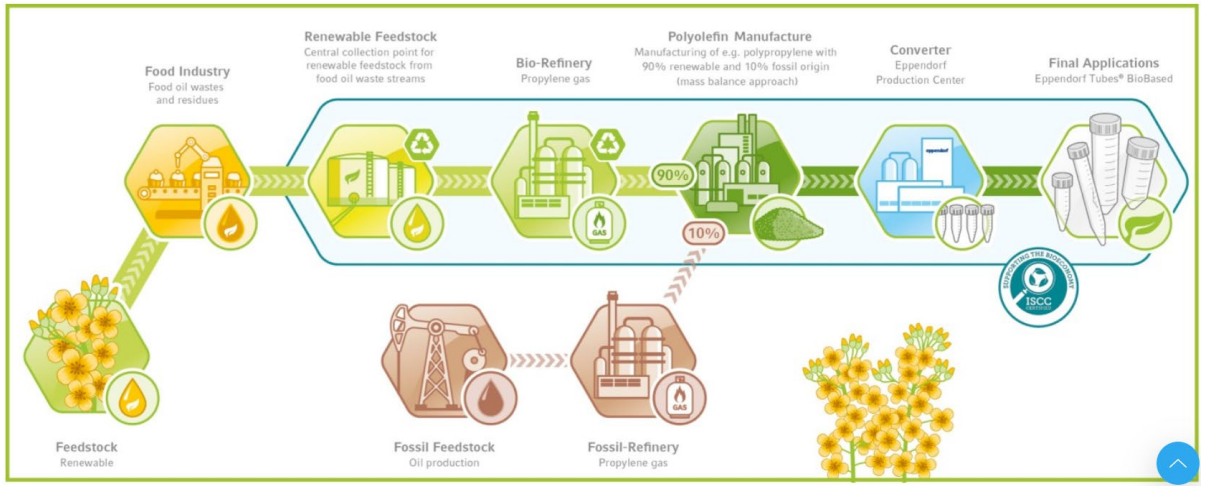
The Future of Laboratory Services

- Allowing laboratories to generate and manage themselves improves business continuity and resilience
- It may reduce the single-use business opportunities, but creates a new one – Services
- E.g. of the Krakatoa Cell culture media





Biobased Tubes



Full length article

Environmental life cycle assessment of polypropylene made from used cooking oil

Christian Moretti [a], Martin Junginger [a], Li Shen [a]

Show more

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https://doi.org/10.1016/j.resconrec.2020.104750 Get rights and content

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"A life cycle analysis compared the conventional way to produce polypropylene made of crude oil and the process with used cooking oil as raw material and showed that the second process has a 62% lower impact on climate change [12]."

Back to Basics

New Results

Follow this preprint

Re-use of labware reduces CO_2 equivalent footprint and running costs in laboratories

Martin Farley, Benoit P. Nicolet

doi: https://doi.org/10.1101/2022.01.14.476337

This article is a preprint and has not been certified by peer review [what does this mean?].

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Abstract | Full Text | Info/History | Metrics | Preview PDF

ABSTRACT

Laboratory-based research is resource intensive in terms of financial costs and its carbon footprint. Research laboratories require immense amounts of energy to power equipment, as well as large volumes of materials, particularly of single-use item

Staff Support, Technical Staff

NTDC and LEAF Collaborate on Pilot Project

Improving Sustainability in Technical areas Pilot Project: UCL's LEAF and the NTDC are working with Edinburgh Napier, Liverpool, Manchester Metropolitan, Newcastle and Reading Universities.

How can we contribute to addressing the current climate and ecological emergencies?

As with most situations, emergencies and changes in regulations that affect the HE Sector, the response tends to be "an individual approach" at the local institutional level or at best within a local group of universities. We rarely start to address a situation by having a joined-up approach. This also applies to the ongoing issues surrounding the environment, sustainability and climate change. The pressure on the sector is mounting and with the 26th United Nations Climate Change conference, COP26 scheduled for this November in Glasgow, the Government will quickly increase that pressure to reduce our carbon footprint and to achieve net-zero carbon.

- Technical staff will be shown to be worth investing in, in all senses
- Research staff will have more targets from funders…

Sustainable & Green Laboratories

HEaTED

Description

Learn how to integrate sustainability within laboratory settings – Improve your CV, save money, reduce carbon, and have fun!

Laboratories and clinical spaces contribute up to 2% of the world's plastic waste. They also use 3-10 times more energy than typical academic spaces. This presents a huge opportunity to improve our working practices to make the research environment more sustainable.

There is a burgeoning field in 'laboratory sustainability' or 'green labs', which aims to improve research outcomes, reduce the cost of research and minimize the environmental impact of laboratories.

This course introduces laboratory sustainability and provides a brief background on how this topic came to be.

Research & Funding Directions

Funding opportunity

Environmental sustainability in life sciences and medical practice

Opportunity status:	Open
Funders:	Medical Research Council (MRC)
Funding type:	Grant
Total fund:	£1,000,000
Maximum award:	£100,000
Publication date:	15 December 2021
Opening date:	3 January 2022
Closing date:	1 March 2022 16:00 UK time

Last updated: 13 January 2022

Timeline

- **3 January 2022 00:00**
  Opening date for outline applications
- **End of January (to be confirmed)**
  Webinar about the call
- **1 March 2022 16:00**
  Closing date for outline applications
- **13 May 2022 (to be confirmed)**

NET ZERO Funding

Sustainability Standards will be required, just like H&S

THE LABORATORY EFFICIENCY ASSESSMENT FRAMEWORK

LEAF

MRC announces membership of laboratory efficiency framework

Subscribe to UKRI emails

Sign up for news, views, events and funding alerts.

Email address

Subscribe

2 December 2021

Membership of Laboratory Efficiency Assessment Framework (LEAF) offers a new approach to improving the environmental sustainability of lab work for MRC.

MRC Strategic Delivery Plan 2022-2025: "..target "gold" status for our organisations in the LEAF scheme."

LEAF Update

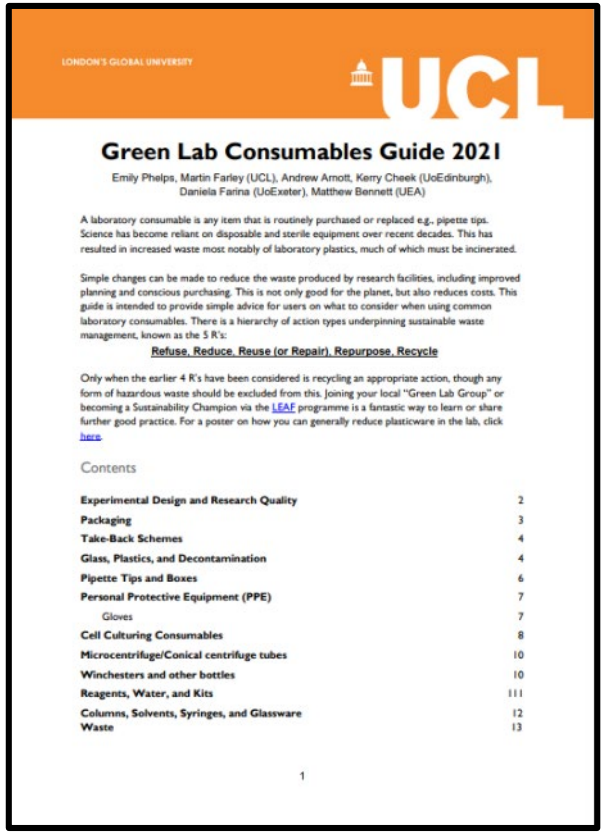
- Been online for just over 1 year
- 81 Institutions signed up since going live from 14 countries
- 2,200 users and over 1,300 labs!
- World's largest Green Lab Programme
- Both Exeter and Bristol have reached 100% uptake in their labs, the only institutions in the world to accomplish this

National Technician Development Centre for Higher Education

UK Research and Innovation

Medical Research Council

Resources will continue to improve



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Green Lab Consumables Guide 2021

Emily Phelps, Martin Farley (UCL), Andrew Arnott, Kerry Cheek (UoEdinburgh), Daniela Farina (UoExeter), Matthew Bennett (UEA)

A laboratory consumable is any item that is routinely purchased or replaced e.g., pipette tips. Science has become reliant on disposable and sterile equipment over recent decades. This has resulted in increased waste most notably of laboratory plastics, much of which must be incinerated.

Simple changes can be made to reduce the waste produced by research facilities, including improved planning and conscious purchasing. This is not only good for the planet, but also reduces costs. This guide is intended to provide simple advice for users on what to consider when using common laboratory consumables. There is a hierarchy of action types underpinning sustainable waste management, known as the 5 R's:

Refuse, Reduce, Reuse (or Repair), Repurpose, Recycle

Only when the earlier 4 R's have been considered is recycling an appropriate action, though any form of hazardous waste should be excluded from this. Joining your local "Green Lab Group" or becoming a Sustainability Champion via the LEAF programme is a fantastic way to learn or share further good practice. For a poster on how you can generally reduce plasticware in the lab, click here.

Contents

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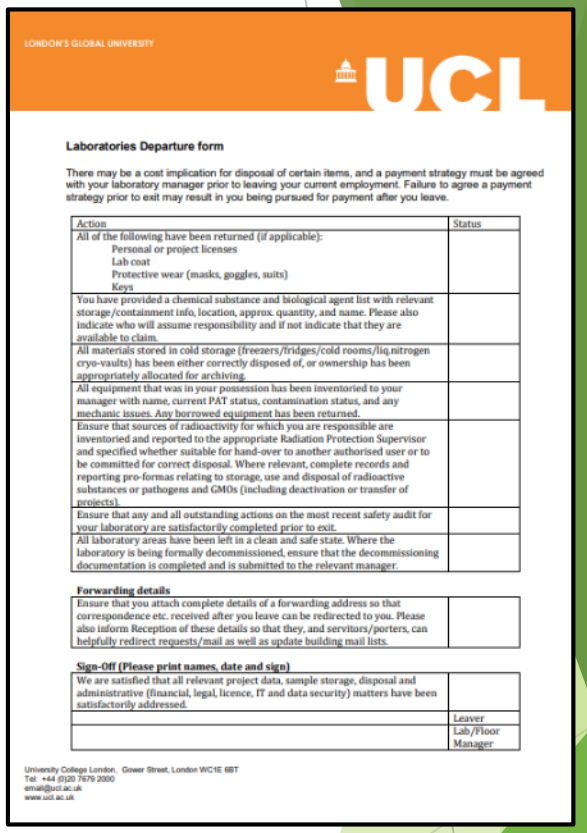

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Laboratories Departure form

There may be a cost implication for disposal of certain items, and a payment strategy must be agreed with your laboratory manager prior to leaving your current employment. Failure to agree a payment strategy prior to exit may result in you being pursued for payment after you leave.

Action	Status
All of the following have been returned (if applicable): Personal or project licenses Lab coat Protective wear (masks, goggles, suits) Keys	
You have provided a chemical substance and biological agent list with relevant storage/containment info, location, approx. quantity, and name. Please also indicate who will assume responsibility and if not indicate that they are available to claim.	
All materials stored in cold storage (freezers/fridges/cold rooms/liq.nitrogen cryo-vaults) has been either correctly disposed of, or ownership has been appropriately allocated for archiving.	
All equipment that was in your possession has been inventoried to your manager with name, current PAT status, contamination status, and any mechanic issues. Any borrowed equipment has been returned.	
Ensure that sources of radioactivity for which you are responsible are inventoried and reported to the appropriate Radiation Protection Supervisor and specified whether suitable for hand-over to another authorised user or to be committed for correct disposal. Where relevant, complete records and reporting pro-formas relating to storage, use and disposal of radioactive substances or pathogens and GMOs (including deactivation or transfer of projects).	
Ensure that any and all outstanding actions on the most recent safety audit for your laboratory are satisfactorily completed prior to exit.	
All laboratory areas have been left in a clean and safe state. Where the laboratory is being formally decommissioned, ensure that the decommissioning documentation is completed and is submitted to the relevant manager.	

Forwarding details

Ensure that you attach complete details of a forwarding address so that correspondence etc. received after you leave can be redirected to you. Please also inform Reception of these details so that they, and servitors/porters, can helpfully redirect requests/mail as well as update building mail lists.	

Sign-Off (Please print names, date and sign)

We are satisfied that all relevant project data, sample storage, disposal and administrative (financial, legal, licence, IT and data security) matters have been satisfactorily addressed.	
	Leaver
	Lab/Floor Manager

University College London, Gower Street, London WC1E 6BT
Tel: +44 (0)20 7679 2000
email@ucl.ac.uk
www.ucl.ac.uk

- https://www.ucl.ac.uk/sustainable/staff/labs/resources-and-materials

What will LEAF look like?

- Currently developing LEAF for new specialist spaces, including:
  - Commercial laboratories (piloting with Unilever)
  - Clinical/Diagnostic laboratories (piloting Viapath, NHS)
  - Animal Facilities
  - Workshop / Engineering
  - Computing / dry laboratories

<u>Please allow us 6 months for these to be fully integrated</u>

Green ED

Like LEAF, but for Emergency room spaces

Thank you!

@GreenLabGuy
@LEAFinLabs

m.farley@ucl.ac.uk

THANK YOU
-Sustainable UCL
-UCL ISD, Vindya Dassanayake, Aaron Kashab
-Joanna Marshall-Cook, UCL
-KCL Sustainability
-UoBristol Sustainability, Exeter
-UK Reproducibility Network
-NTDC
-Andy Evans, Green Light Labs
-Matthew Bennett, UEA/UCL
-Nikoline Borgermann, UoCopenhagen
-MRC/UKRI/NERC
-LEAN UK
-SELs
-Benoit Nicolet, Sanquin
-Saroj Saurya, Charlotte Houghton, Oxford
-Daniela Farina, Exeter
-Everyone attending today!

-Claire De La Motte, EAUC
-Talia Caplan, Wellcome
-Elena Dimitrova, MRC