NWUPC Annual Conference 2026

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Laboratory Sustainability and LEAF

Jenna Lowe, Laboratory Sustainability Officer at the University of Liverpool.

UNIVERSITY OF LIVERPOOL | 17TH JUNE 2026

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Laboratory Sustainability and LEAF

NWUPC Annual Conference 17/06/2026

Jenna Lowe – Laboratory Sustainability Officer

Sustainability Team

Sustainability Strategy and Impact Team, Directorate of Finance Planning and Change

Sally Shaw – Associate Director of Sustainability

Alex Preugschat – Sustainability Officer

Kate Sisodia - Sustainability Engagement Manager

Laela Purvis Greenway – Sustainability Officer

Grace Trotman – Sustainability Graduate Intern

Jenna Lowe – Laboratory Sustainability Officer

Environmental Sustainability and Energy Services Team, Property and Campus Services

Rachael Hanmer Dwight – Head of Environmental Sustainability and Energy Services

Tom Weldon – Environmental Sustainability Officer

Ben Parker – Energy and Utilities Manager

Rhiannon Hunt – Circular Economy Manager

Will McCormack – Carbon and Energy Officer

Sam Hay – Waste and Recycling Officer

Governance

Delivery of the Sustainability Strategy is overseen by the University Sustainability Committee

Chair: SLT Lead, Nicola Davies (Chief Financial Officer)

- Education Pillar Lead: Prof Phil Drake, HSS
- Research Pillar Lead: Prof Katie Atkinson, S&E
- Faculties Lead: Nicola Sandman, HLS
- Operations Pillar Lead: Syd Cottle, PCS

- Other members: Associate Director of Sustainability (Deputy Chair), Group Director of IT and Digital Services, Group Director Property and Campus Services, Director of Procurement, Director of Human Resources, Director of Marketing, Guild Officer

The committee monitors three action plans:

1. Research – owned by Research & Impact Committee
2. Education and student experience – owned by Education Committee
3. Operations – owned by the Sustainable Campus Operations Group

It also monitors strategic risk; sustainability spend; corporate audits, external reporting and rankings submissions.

SLT receives progress reports twice yearly as part of L2031 reporting (via Strategic Planning) as well as regular reports directly from Sustainability Committee

Overview

Sustainability is a cross-cutting theme in Liverpool 2031 and is underpinned by a University-wide Sustainability Strategy, published in Feb 2025

- Commitments are organised under 3 pillars: research, education and student experience, campus operations
- Research covers *what* research we do and *how* we do it
- Education includes formal curriculum *and* co-curricular activity *as well as* the wider student experience
- Campus operations supports our Net Zero targets, nature and biodiversity across our estate, and environmental management and compliance.

Strategic Priorities for 2026

Research

- Increase the visibility of sustainability research via SDG tagging/communications plans (linked to wider reputation priorities)
- Implement the Concordat for the Environmental Sustainability of Research and Innovation
- LEAF silver and gold awards for all labs

Education and Student Experience

- Embed ESD in the formal UG curriculum
- Roll out the Living Labs programme
- Update the Sustainability in Action module

Campus Operations

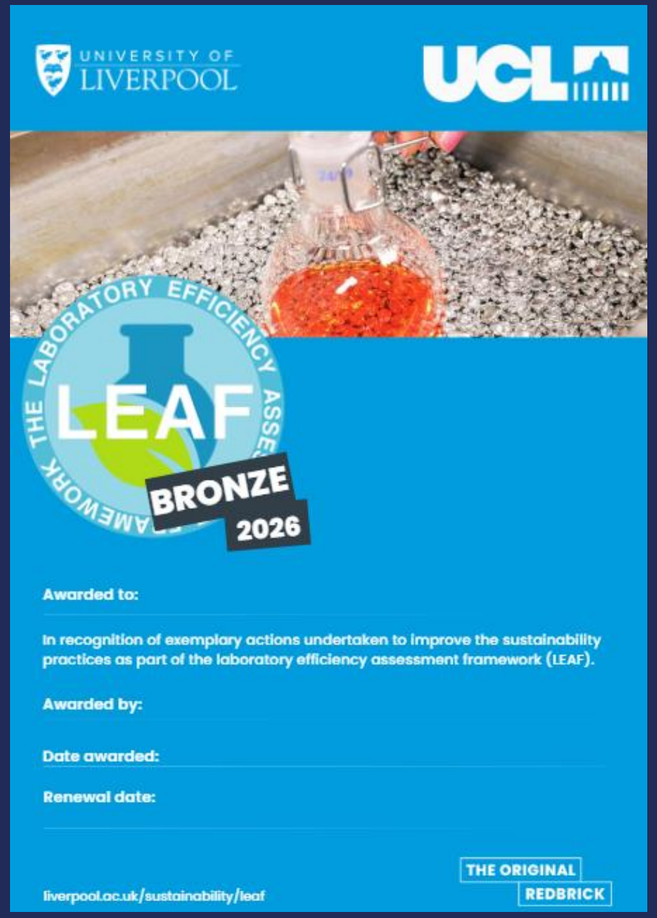
- Launch and implement the new Energy Strategy, Travel Plan, Waste Management and Resources Plan
- Biodiversity interventions following estate-wide habitat surveys in 2025

Governance and Reporting

- Local action plan development and monitoring via SOS-UK Green Impact tool
- Strong focus on reputation and rankings
- Data dashboards
- Scope 3 carbon reporting

What is the Laboratory Efficiency Assessment Framework (LEAF)

- LEAF is a green initiative used to improve the sustainability and efficiency of laboratories, technical workspaces, workshops, studios and galleries.
- LEAF is a program that evaluates the sustainability of laboratories and helps them reduce their carbon footprint. By providing laboratories with guidance and resources, LEAF helps increase efficiency in 10 area’s
- Participating laboratories are awarded either a Bronze, Silver, or Gold award depending on how many sustainable actions they take.



What LEAF covers

Category	Bronze	Silver	Gold
Waste	Required waste bins are provided with clear signage	Single-use plastic waste has been reduced (guidance provided)	Re-use of materials have been implemented. Recycling rates have been increased, or overall waste produced has been decreased
People	Samples owned by departing staff are cleared or tracked	The lab has engaged with other labs on LEAF and sustainability	One action to reduce travel has been implemented
Purchasing	Energy and materials consumption is considered during the purchase of new equipment	The lab makes use of take back schemes offered by manufacturers	LED’s are used where feasible
Equipment	Equipment is turned off when not in use	There is a system in place for communal equipment booking	Excess equipment is repaired, sold, and/or donated
IT	Computer monitor brightness has been reduced	Critical data is backed up	Computing code has been optimised

What LEAF covers

Category	Bronze	Silver	Gold
Sample and chemical management	Labels are legible, and there's a common labelling system in place	Procedures are in place in case cold storage equipment breaks down	At least 85% of all samples and/or chemicals are clearly catalogued
Research Quality	Common methods are available centrally	Labs are aware of core facilities	Sterilisation methods have been optimised
Teaching		An awareness of environmental impact is incorporated into practical teaching	Environmental impacts are considered in the design of experimental procedures
Ventilation	There is a clear reporting system for building issues	Fume cupboard sashes are kept closed when not in use	Solvent vapours are condensed and disposed of and not released into the atmosphere
Water		Sustainable water use is communicated to all lab users	Guidance is provided on the appropriate use of drains

The LEAF process

- Register
- Choose your level (Bronze, Silver, Gold)
- Work through the criteria, providing evidence for each.
- There are 18 questions for bronze, a further 17 questions for silver and then a further 15 for gold.
- Submit
- Audit (30-60 minutes)
- Calculators are available to help you estimate the impact of changes

My Sustainability Journey

- Core Technician in one of our Biological Research Laboratories
- In 2021 the University signed up to pilot LEAF with the NTDC (National Technicians Development Centre) and 4 other institutions
- I took part in this pilot for my laboratory and gained the bronze award
- Started a 0.2 secondment in 2022 to roll out LEAF in the Faculty of Health and Life Sciences
- Started a 2-year full time secondment in 2023 as a Laboratory Sustainability Officer
- This became permanent in 2025

LEAF at Liverpool

147 eligible laboratories

Total qualifying labs	147
Labs signed up	147 (100%)
Total labs with awards	147 (100%)
Total bronze awards	60 (41%)
Total silver awards	62 (42%)
Total gold awards	25 (17%)

Faculty of Health and Life Sciences

Bronze	13 (20%)
Silver	31 (49%)
Gold	20 (31%)

Faculty of Science and Engineering

Bronze	47 (57%)
Silver	30 (37%)
Gold	5(6%)

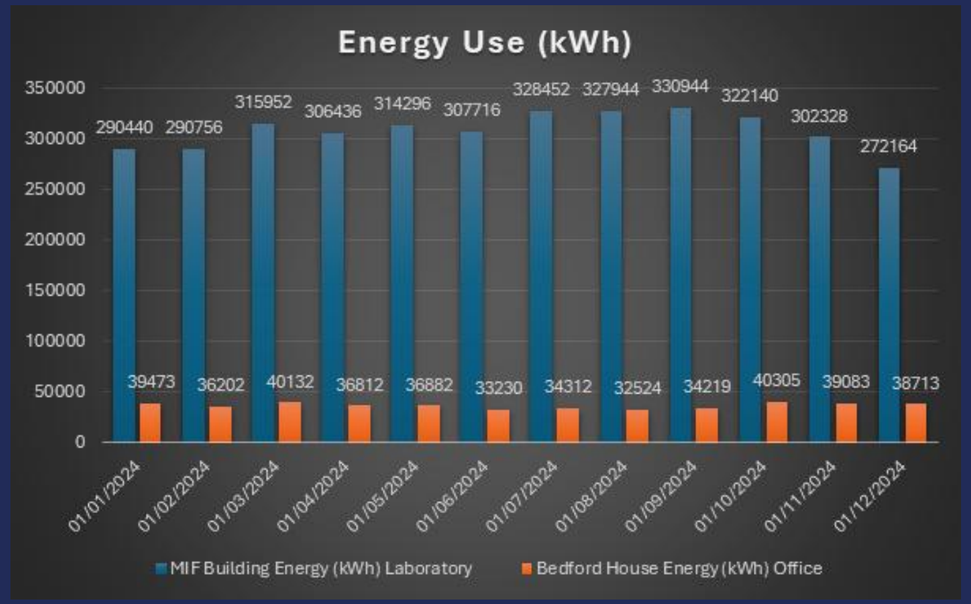
Faculty of Humanities and Social Science

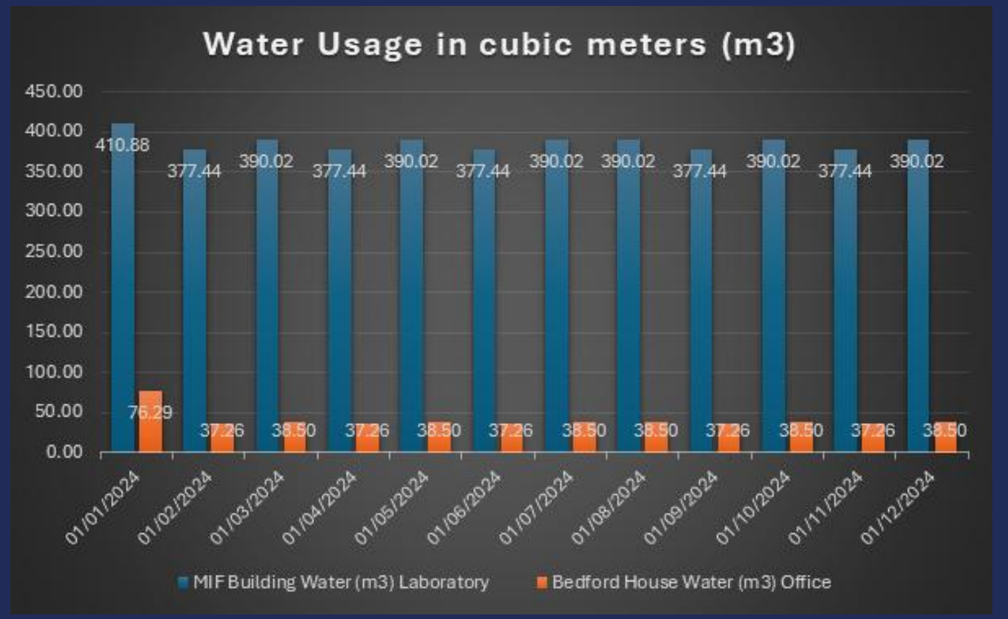
Silver	1 (100%)

Challenges faced

- Identifying the number of laboratories on campus
- Getting laboratories signed up
- Time/resource constraints
- Keeping up with renewals

Why LEAF is important





"Going green is no longer an option but a requirement for creating long-term, positive changes to the way we operate in the lab" My Green Lab

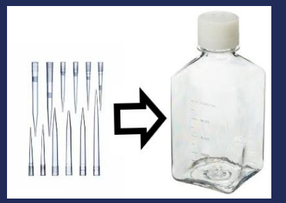
Why LEAF is important – Waste

- Laboratories produce around 5.5 million tonnes of plastic waste per year
- Clinical waste can cost 5-10 times more to dispose of than normal waste and the incineration process is very energy intensive
- Laboratories should have labelled waste bins readily available for clinical, general and recycling

Why LEAF is important - Consumables

- Laboratory plastics account for 2% of the of the total plastic waste generated globally each year, in 2015 a *Nature* article was published that estimated that academic research laboratories produce 5.5 million tons of plastic waste each year.

- Reducing the use of consumables has a number of benefits:
  - Less consumables being purchased and therefore reducing costs
  - Less waste produced
  - Less manufacturing
  - Fewer deliveries and the carbon associated with this



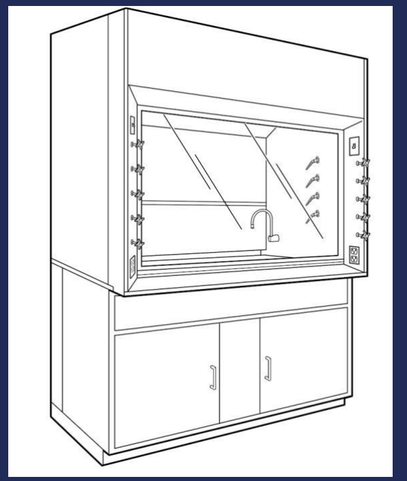
Why LEAF is important – Energy

- 40% of global CO2 emissions come from generating electricity and since laboratories consume 10 times more energy than a typical office building they are one of the most energy intensive industries.

- ULT freezers:
  - Usually set at -80ºC but changing to -70ºC can save 30% energy

- Fume hoods:
  - Close sash after use
  - Only take in items you need
  - Do not use for storage.

- Other equipment – switch off when not in use.

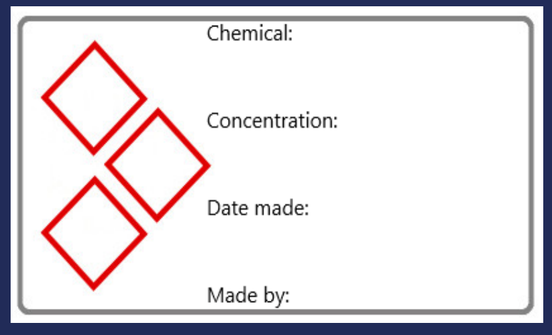


Why LEAF is important – Chemical Management

- Chemical management can cost up to £1 for every £1 spent on the chemical itself. A good chemical management system can help laboratories keep track of their chemicals and prevent unnecessary waste.

- Preparing chemicals:
  - Can a less hazardous chemical be used?
  - Plan experiments in advance and only make up the required amount of chemicals – it is better to prevent waste than treat it or clean up waste after it has been created.

- Labelling: Make sure chemicals are well labelled with:
  - Chemical name and concentration
  - Date prepared
  - Name
  - Hazard labels



Why LEAF is important – Water

- Laboratories use 4x more water than office spaces
- Autoclaves can use up to 230 litres of water per cycle
- It can take 5L of tap water to make 1L of ultra-pure water, wasting 4L of water down the drain

Type 1 or ultrapure water is the purest form of water, it has extremely low levels of ions, organics and biological contaminants. Type 1 water is used for the most critical applications including:

- Cell and Tissue Culture
- Liquid Chromatography, including High Performance Liquid Chromatography (HPLC)
- Gas Chromatography
- Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
- Molecular Biology
- Polymerase Chain Reaction (PCR)

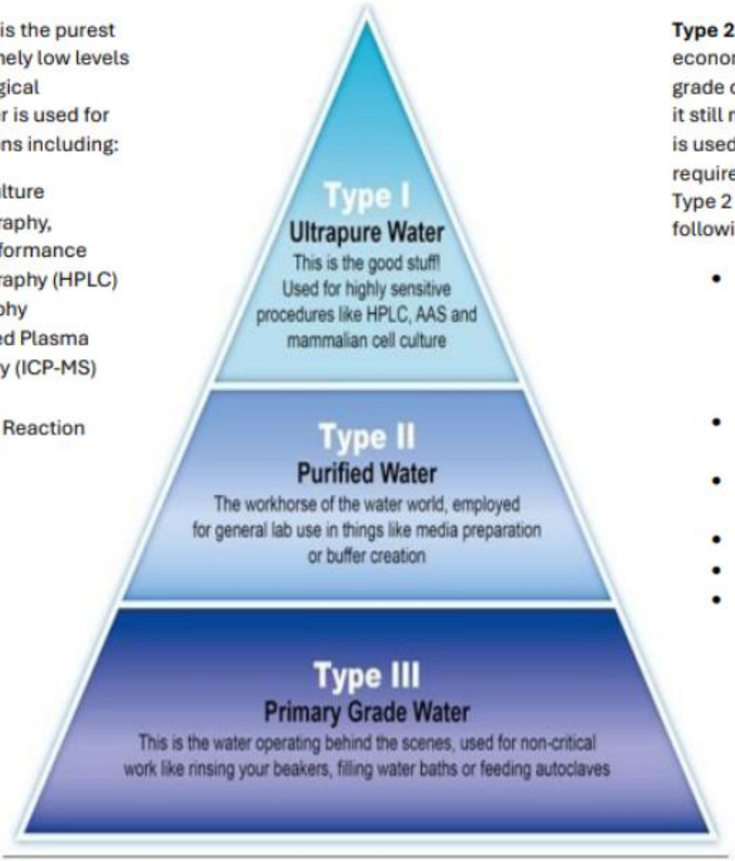


Diagram showing the different types of water used in the lab: ultrapure water, pure water and primary grade water. (c) ELGA LabWater 2014

Type 2 or deionised water is more economical and uses a different grade of ion-exchange resin. While it still maintains a high purity level it is used for applications that don't require the highest level of purity. Type 2 water can be used in the following applications:

- General Lab Practices
  - Buffer preparation
  - Media preparation
  - Sample dilution
  - General chemistry
- Feed water for clinical analysers
- Microbiological Analysis and preparation
- Electrochemistry
- FAAS
- General

Type 3 or RO water is produced through the purification technology reverse osmosis, it is the most economical method of removing up to 99% of contaminants in potable water. Type 3 has the lowest purity level and can be used for the following applications:

- Cleaning glassware
- Water baths
- Autoclave feed

Why LEAF is important – Funder Requirements

wellcome

- Laboratories should achieve the minimum level of accreditation offered by LEAF, My Green Lab or equivalent by the end of 2025.

CANCER RESEARCH UK

4.1 Requirements for CRUK funding applicants

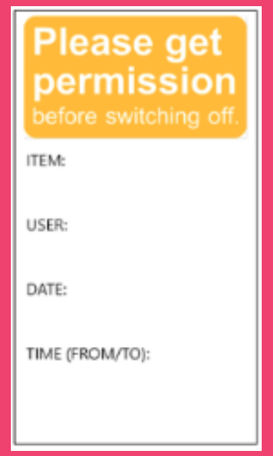
To be eligible for CRUK response-mode grant funding, Lead and Joint Lead applicants must each:

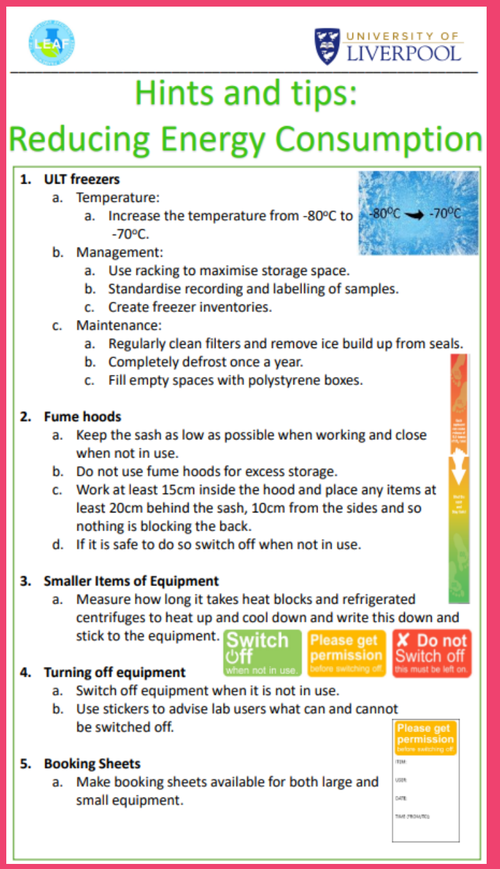
- hold either the Laboratory Efficiency Assessment Framework (LEAF) or the My Green Lab Certification at the Silver level for their research group(s) at the time of submission;
- either attach LEAF or My Green Lab Certification to their funding application or provide a link to a publicly available list of accredited research groups at their Host Institution(s).

What we are doing to help laboratories - Guidance

- Achieving Bronze/silver/gold
- Chemical management,
- Green chemistry (also share LEAF guide for biological laboratories and one of our laboratories created a guide for microbiology laboratories)
- Reducing consumable use
- Energy consumption
- Sustainable water use

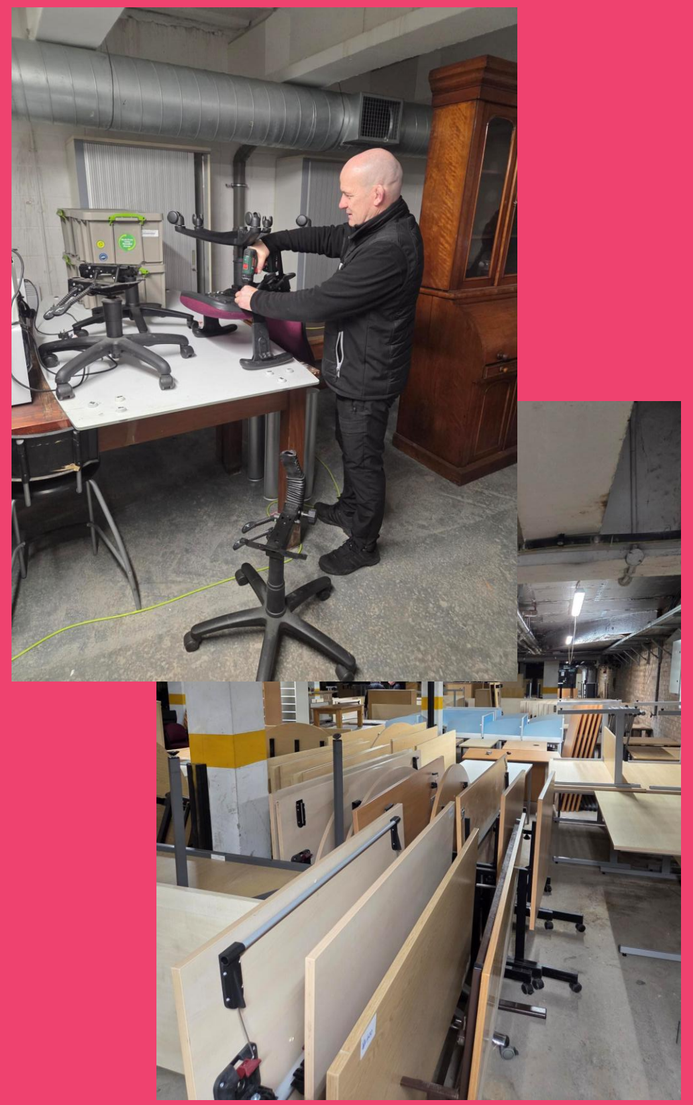
- Sustainable laboratories guidance





Reuse – Warp It

- Established in Sustainability Week 2025
- An internal reuse platform for the redistribution of surplus furniture, equipment, stationery and consumables
- In the first 12 months, Warp It has saved:
  - **39** tonnes waste
  - **149** tonnes CO_2e
  - **£326,720**
- Future priorities:
  - Integrating repair, reupholstery and upcycling services
  - Embedding Warp It into the design stage
  - Expanding the range of items listed



Resale – Uni Green Scheme

- External resale and reuse of surplus laboratory equipment.

- Central monitoring of equipment collection, resale and value recovery with regular collection dates.

- In the 24/25 academic year the scheme achieved:
  - **26** surplus items collected
  - **44** items sold
  - **£20,000** net financial benefit
  - **2.6** tonnes waste avoided
  - **9.3** tonnes CO_2e saved

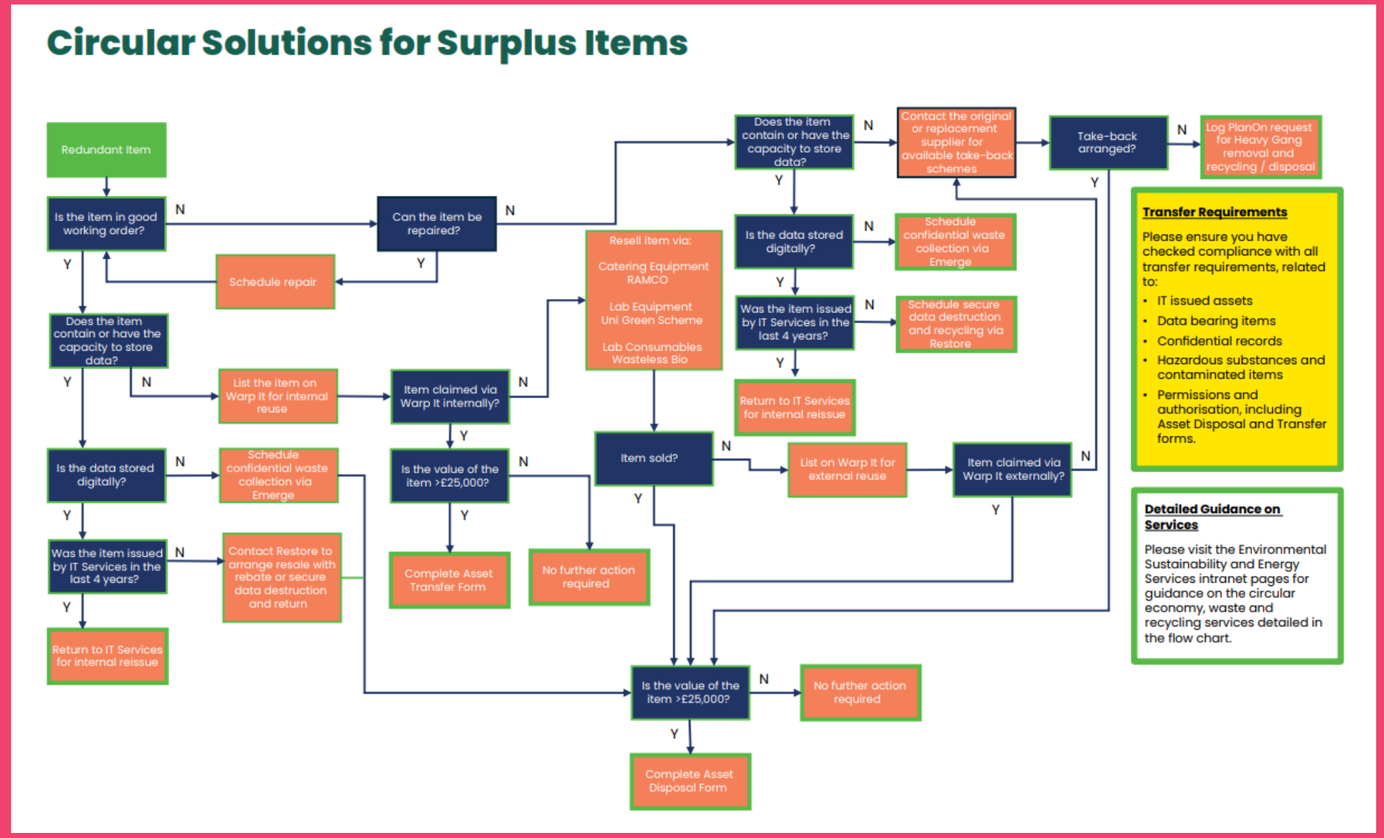
- Future priorities:
  - Clearance of legacy items in storage
  - Exploring opportunities for the procurement of second-hand equipment

Resale – Wasteless Bio

- Currently trialling a resale service for surplus laboratory consumables
- Items are sold on a marketplace, with a percentage of the revenue shared with Wasteless Bio
- Future priorities:
  - Evaluating the success of the trial
  - Establishing a formal process and guidance

Circular Economy and Waste Guidance

- Flow diagram of circular solutions for surplus items incorporated into the Sustainable Laboratories Guide.
- Signposting to information available on the sustainability intranet site.



Case studies

Case Study 1 – single use plastic to glass

"Previously, we used single-use polystyrene vials and single-use cotton balls as closures. Every year, we used, autoclaved and then discarded >200,000 vials and cotton balls which equates to 1,300kg plastic and 240kg cotton wool. This waste was by far the majority of waste created by the lab.

Following on from the success of switching to glass bottles in previous years, in 2023 the lab purchased a washer, reusable glass vials and washable bung closures that can be washed and reused indefinitely. From a sustainability perspective, the following benefits apply:

- *Eliminate emissions from the production and transport of the boxes of single use plastic vials and cotton wool (~10-12 deliveries per year), to be replaced with glass vials and bungs that can be used indefinitely.*

- *Abolish packaging waste from deliveries of disposable plastic vials and cotton wool, >360 cardboard boxes; >2000 plastic bags*

- *Reduce waste and emissions associated with autoclaving waste vials (est. 1,700 autoclave bags used for disposal)*

- *Reduce the waste output of the facility by >90%"*

Case studies

Case Study 2 – reducing the energy demand of equipment

“As energy use is the main factor where the X-ray CT imaging lab can make sustainability changes, the lab initiated a pilot study with the manufacturer of the instrument to reduce power consumption. The pilot study was successful, and the instrument is now operating with new parameters, with reduces energy consumption by approximately 30%. The instrument manufacturer is currently preparing roll-out of the new parameters to all similar instruments worldwide.”

Case study 3 – ScrubCycle

“We have developed and launched a new reuse programme called ScrubCycle, designed to reduce textile waste associated with clinical placement scrubs. Previously, students were issued five sets of scrubs, and any additional sets—whether due to damage, wear, or changes in size—were individually purchased, resulting in unnecessary waste and over-ordering.

Through ScrubCycle, we invited final-year students approaching graduation to donate any clean, good-quality scrubs they no longer needed. This initiative received an exceptionally positive response, and over the summer we collected several hundred sets. These scrubs are now made available for current students to borrow or keep for as long as required, significantly reducing the need to purchase new items and promoting a circular, resource-efficient approach.”

Case studies

Case Study 4 – 3D printed reusable infusion port

“Each year, hundreds of saline IV bags are used by students at the Institute of Population Health for practical training. While single use items are vital in clinical settings to prevent infection, these measures aren’t required in simulated training environments.

Our Maker Space used rapid prototyping to develop a reusable infusion port. This innovation allows IV bags to be safely refilled with tap water for training purposes, significantly reducing plastic waste. The final design features:

A 3D-printed infusion port with a pierceable plastic membrane

A laser-cut washer and bung made from natural rubber

A screw-in cap that mimics the original sealing mechanism

Only the pierceable plastic membrane requires replacement after each use and this can be quickly and easily reprinted. The printed components can also be recycled at end of use.

Compared to a traditional saline bag costing around £4, the new system costs just 25p in materials to print, and only 7p thereafter to reprint the pierceable plastic membrane for each subsequent refill. This could result in hundreds of pounds in savings and a significant reduction in plastic waste.”

Benefits to taking part in LEAF

- Reducing the carbon impact of your laboratory
- Saving energy
- Saving water
- Reducing waste
- Cost savings
- Increasing the changes of funding
- Reputational benefits

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Thank you.
Any Questions?

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