



PRIMARY IMPACT AREA FOR CLIMATE CHANGE

LABS

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INTRODUCTION

This document aims to provide information in as simple and brief a form as possible, of the aspects that can be considered in applying action to reduce the impacts on climate emissions on goods or service procured by institutions.

- Section 1 provides information on framework agreements that are available to the sector that have climate emission reduction / low climate emission options either as a fundamental part of the framework or as a lot within the framework or otherwise as provided for via the framework.
- Section 2 contains potential short-term permanent changes that can be made now for this PIACC area / sub-area
- Section 3 contains potential longer term aspects that may need a longer lead-in / planning time and / or liaison with other parties. This can include aspects where the CEPWG may be able to collectively represent the sector and seek change in policy, regulations etc, and if applicable, engage other sector bodies and individuals in influencing the desired changes.
- Section 4 contains details of other working groups / organisations that may also be working on similar work to the area covered by this document.
- Section 5 contains links to other sources of information that have been reviewed by a CEPWG PIACC Member.
- Section 6 contains (where applicable) potential sources of funding / grants that may be available to develop work in this area.
- Section 7 contains information on Lifecycle Impact / Whole Life Costing, which identify and assess the social and environmental impacts as well as whole life costing factors for this area.
- Annex 1 contains information on examples of good practice already identified in relation to this PIACC / case studies, / draft codes of good practice etc (or further links to them).
- Annex 2 contains information from the APUC Responsible Procurement Guides in relation to carbon reduction

SECTION 1 – FRAMEWORK AGREEMENTS

Find below information on framework agreements that are available to the sector that have climate emission reduction / low climate emission options either as a fundamental part of the framework or as a lot within the framework or otherwise as provided for via the framework:

LAB1023AP 3D Printers, 3D Scanners & associated equipment

Suppliers on this Framework Agreement were asked to demonstrate any activities and services they offer to minimise the negative impact their business can have on the environment. Full Environmental Policies and tender responses are available on the APUC internal SharePoint. The following highlights what suppliers can offer:

CREAT3D: minimise and recycle waste; purchase and use sustainable products where feasible (e.g. recycled, from renewable sources, FSC or low environmental impact); adopt environmentally sound transportation/logistics strategy; work with logistics providers that offer an environmentally sound service and reduce carbon offset; train employees in good environmental practice.

Abergower: minimise impact in the production of paper in business activities through document scanning; company policy requires them to monitor all elements that contribute to carbon foot print such as packaging, processes and procedures, energy consumption, methods of travel, working practices and the efforts and policies adopted to positively reduce energy consumption and any waste material produced; reporting mechanism, and awareness and training conducted on a regular basis on environmental impact.

Express Group: provides the following services: re-use and repair; they can collect and recycle the 3D prints, printer parts and electronic components from customers; they are planning a PLA recycling programme; offer training and support to minimise customer's waste from failed prints; they can manage customers' consumables including taking back empties/unused to minimise waste.

LAB1024AP Laboratory Chemicals and Consumables

Suppliers on this Framework Agreement were asked to demonstrate any activities and services they offer to minimise the negative impact their business can have on the environment. Full Environmental Policies and tender responses are available on the APUC internal SharePoint. The following highlights what suppliers can offer:

Alpha Laboratories: Recycling of High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE), polypropylene (PP) and polycarbonate (PC) free of charge. Recycling bags sent out after simple sign up process. Greener packaging offered via 70% recycled cardboard in primary packaging coupled with sustainably sourced secondary packaging coupled with the minimising of the use void fill. Offering of greener alternatives for lab plastics such as pipette tips. Engaging in carbon offsetting by planting trees when certain ranges are purchased.

Anachem: Metler Toledo has its MT Green Initiative which is committed to conducting business in a manner that minimises environmental impact by reducing energy consumption and manufacturing waste. This initiative consists of the following:

- Highly recyclable pipette tip rack
- Plastic Resin Code Indicators to help users identify recyclable items by their code
- Pre-sorting plastics using these resin codes at the point of recycling

Camlab: waste is disposed following recycling guidelines; monitoring total carbon output and have management led goals to reduce this figure; installation of solar panels on roof and introduction of LED and motion sensors; their approach is 'refuse, reduce, recycle or replace'. Compulsory online training to all staff on workplace environmental awareness.

Offering a free-of-charge take-back scheme on pre-agreed laboratory plastics and packaging supplied by Camlab. All items returned in this scheme would be recycled for further use.

Fisher: Launched the Greener Choice program in 2020, which flags 12 distinct supplier-qualified environmental claims, based on industry standards. This program will enable customer to select products that meet their carbon emission reduction criteria, such as Energy Star certified products and products manufactured with renewable energy. Also the latest Euro 6 compliant vehicles in their fleet whilst ensuring route planning is used to minimise wasted journeys wherever possible.

Fisher Scientific also offers a number of supplier driven Recycling Programs globally and is committed to maximising recycling opportunities. Current programs include:

- Glove Recycling Program
- Garment Recycling Program
- Life science plastics recycling program
- Pipette Tip Box Recycling
- Glass Chemical Bottles and packaging

Greiner: introduced project 'The Green Spirit' to tackle the environmental, social and economic issues faced by the company as a business involved with utilising non-renewable raw materials: raw materials sourced from suppliers located close to the appropriate manufacturing facilities; raw materials are stored in silos to avoid the undue use of additional packaging materials; their 80 tonne capacity silos enable bulk deliveries; manufacturing efficiency: only uses modern energy efficient electrical equipment, recycling solution as moulding process are recycled into plastic granules, heat recovery system uses waste heat generated in production of heat offices; packaging: boxes consist of 100% recycled material, boxes and plastic sheeting recycled, part of Europool swap scheme; develop new product designs that minimise packaging and lab waste, e.g. miniaturisation of microplate based assays from 96-well to 384- and 1536-well format; delivery suppliers (FedEx and John Hackling): meet Euro 6 emission standards.

Merck: Objective set to limit the loss of raw materials and reduce the impact of waste disposal practises on ecosystems by working to lower their Waste SCORE BY 5% by 2025 compared to their 2016 baseline. Launched SMASH Packaging in 2019 which is a sustainable packaging strategy which aims to eliminate the use of excessive packaging including the use of alternative packaging materials which do not cause deforestation.

Offering greener alternatives to standard sterile filtration systems to reduce the amount of plastic used by utilising more efficient designs incorporating recycled materials.

SLS: created 'SLS Assured' range of sustainably produced (or converted from 'non-sustainable' to 'sustainable') products. SLS compliance team evaluates suppliers to ensure that the supply chain avoids sourcing products from countries or companies that have a poor record with issues such as conflict minerals or environmentally damaging practices. Supplier Evaluation Questionnaires are sent to all new suppliers to identify risks and non-compliance in the supply chain before the supplier is added to the approved supplier list. SLS work to a 'waste hierarchy' by reusing as much packaging and cardboard as possible. They source bio-degradable packaging material upon request. SLS operate an internal, two stream waste collection for general waste comprising of non-recyclables (food waste and mixed waste), and non-segregated recyclables (waste paper, shredded paper etc). The majority of SLS waste is either directly recycled or sent for energy recovery in preference to landfill, which equates to approximately 95% of total waste being recycled.

SLS operate four waste collection initiatives:

- Pipette Tip Box Recycling Service: A free of charge collection facility that ensures 100% material recovery for used pipette tip boxes.
- Packaging Collection Service: A free of charge collection facility ensuring all packaging is collected and recycled, including other suppliers packaging.
- WEEE Collection Service: it is offered in conjunction with an Environment Agency registered third party waste carrier and ensures all unwanted equipment can be removed from the customer's premises and recycled accordingly.
- Chemical Waste Disposal: solution for the safe transportation and disposal of all types of hazardous chemical waste.

Starlab: Provides a take back scheme for pipette tips where collections of used tips are made free of charge to all TipOne system customers with all tips picked up being granulated for re-use. All TipOne systems products are made from recyclable polypropylene. Starlab also reduces carbon emissions by the following:

- TipOne tips made in a factory powered by 100% sustainable energy (wind)
- Fleet vehicles moving to hybrid and electric power
- Drive to reduce energy in the workplace via working from home initiatives, route planning etc

VWR: Free of Charge Collection for VWR waste packaging and containers and will also provide cages to store empty chemical bottles for collection Free of Charge. Since 2015 all non-recyclable waste has been incinerated with energy recovery. Use of recyclable materials wherever possible for products and packaging with examples such as safety glasses made from recycled fishing nets, cleanroom wipes made from recycled knitted polyester and moulded recycled pulp inserts in packaging for glass bottles.

LAB1028AP Microscopes and Imaging Equipment

Suppliers on this Framework Agreement were asked to demonstrate any activities and services they offer to minimise the negative impact their business can have on the environment. Full Environmental Policies and tender responses are available on the APUC internal SharePoint. The following highlights what suppliers can offer:

Best Scientific: Offers a take back scheme where existing equipment can be traded in for new equipment with old equipment being refurbished and offered for sale. Short term leases also offered for limited requirements. Systems are also designed to allow modularity and upgradeability to reduce incidences of obsolescence.

Cairn Research: Where low energy devices can be used these are incorporated into products. Cairn actively promote configurations that use low power light sources where practical and for existing systems they can implement upgrades that move away from use of high power arc lamp light sources towards discrete low energy LED sources. Cairn hardware configurations are constructed in a modular non-proprietary fashion to allow straightforward reconfiguration to add or change the operation modalities as research requirements evolve to prolong the lifecycle of products.

Nikon: Spare parts are guaranteed for a minimum of five to eight years following discontinuation of equipment to extend the life cycle of existing equipment universities. Steps to reduce the environmental load by utilising streamlined technological capabilities have seen a reduction of over 10K tonnes of CO2 per year. The Nikon Group has focused on developing technologies for emission reduction in the manufacturing process of lenses, one of the largest sources CO2 emissions.

VWR: an annual agreement can be set up between VWR and Institutions whereby waste packaging e.g. empty bottles, cartons, boxes and drums can be returned to the supplier free of charge. All returned packaging is either re-used or sent to a third-party partner Company for recycling.

VWR can arrange a service to collect and dispose of hazardous materials. The charge for this service would depend on the products involved and would therefore be charged on a case-by-case basis.

LAB1016AP Mass Spectrometry & Chromatography Equipment

A *WEEE Regulations and End of Life Care for Mass Spectrometry & Chromatography Equipment* report was developed in October 2019. It contains information about the environmental impact of WEEE, Regulations surrounding WEEE, the current state of supply of this Framework Agreement as well as each Contractor's recycle, take-back and trade-in schemes. It also includes a proposed mitigation plan to address identified risks associated with the disposal of end of life mass spectrometry and chromatography equipment – please refer to the report.

In addition, Suppliers on this Framework Agreement were asked to demonstrate any activities and services they offer to minimise the negative impact their business can have on the environment. Full Environmental Policies and tender responses are available on the APUC internal SharePoint. The following highlights what suppliers can offer:

Shimadzu: In 2010 Shimadzu has launched Save the Energy Project. In research and development, they manufacture and develop more energy-efficient products. Thus, products are more economical for Institutions.

Waters: utilise a life cycle assessment tool to understand how laboratories may operate more efficiently using Waters technology. The life cycle assessment tool takes factors into consideration, including the energy

requirements of the materials that are used to manufacture the instruments, the energy requirements of the instruments as they are being used, and the ultimate disposal of the instrument at the end of its useful life.

Sigma: developed Design for Sustainability (DFS) program to design products with reduced life cycle impacts. This process focuses on utilising recyclable or reusable materials. The program is working to reduce the ecological footprint of products and make disposal as easy as possible for Institutions.

Elementar: Should a request be made to return a decommissioned system back to Elementar, the supplier would accept receipt of an obsolete/decommissioned instrument upon discussion with the Institution. This would not necessarily require purchase of a new instrument; this includes decommissioned instrument that was not originally supplied by Elementar or one of its predecessor companies. The aim is to provide an environmentally friendly disposal.

LAB1018AP Veterinary Supplies

Suppliers on this Framework Agreement were asked to demonstrate any activities and services they offer to minimise the negative impact their business can have on the environment. Full Environmental Policies and tender responses are available on the APUC internal SharePoint.

The following highlights what suppliers can offer:

Covetrus: Covetrus has launched a Green Initiative in Jan 2022 to offer customers a more environmentally friendly choice. This includes a Green Catalogue which includes over 136 recycled or re-used items with a points based reward incentive scheme. E-invoicing is used to reduce paper usage and a traffic light ordering system to reduce CO2 emissions. Also taking part in Carbon Offsetting one tree planted for every £250 spend in the Essentials range.

Mahr Impex: minimise the number of deliveries specifically around back orders; re-use all packaging and boxes generated from deliveries, so orders will be sent in boxes that have already been used; external packaging is recyclable and is 100% cardboard; willing to work with all Institutions for feedback on how to improve.

Karl Storz: consolidate orders to customers whenever possible and in line with customers' requirements; manage order system from supplies to receiving scheduled orders at set times each week to reduce the volume of international required shipments; actively changing car fleet to include hybrid vehicles. Do not offer a collection and/or reuse service for packaging for products supplied yet.

LAB1020AP Pipette Calibration, Repair and Servicing

Contractors of the Framework Agreement were addressed on consumable disposal and carbon emissions at tender. As part of the delivery of the Laboratories Category Responsible Procurement Action Plan, APUC Ltd is working with the Contractors to further understand the environmental sustainability of their consumables

disposal methods and strive for improvements wherever possible. Contractors have been challenged to reduce their carbon emissions by 5% annually and their performance will be measured using the relevant KPI.

The Framework Agreement started in October 2019. Review meetings will start in October 2020 and will track progress on carbon emission reduction on a 6-monthly basis.

In addition, Suppliers on this Framework Agreement were asked to demonstrate any activities and services they offer to minimise the negative impact their business can have on the environment. Full Environmental Policies and tender responses are available on the APUC internal SharePoint. The following highlights what suppliers can offer:

Starlab: work on reducing emissions via the smart ordering of product lines; bulk orders are made for the whole STARLAB group to minimise transportation emissions. Starlab encourages Institutions to order in bulk by offering further discount on case sizes.

Starlab trialled different packing materials to reduce the amount of plastic used in the warehouse: substituted the use of bubble wrap and plastic air pillows with a recycled paper packing material that is 100% biodegradable. This has reduced plastic usage by 50-60%.

Anachem (Mettler Toledo): developed GreenMT program to complete efficiency projects related to lighting, heating, air conditioning, and fleet. Original goal to reduce carbon footprint by 20% compared with 2010 (relative CO2 emissions per net sales) was reached. Committing to a new target to reduce relative CO2 emissions per net sales by 30% by the end of 2025 compared with 2010.

Cole Parmer: pipette Service calibrations clinics at customers sites enables less packaging for shipping pipettes being used and less CO2 emissions due to less pipette boxes being shipped; employees company cars are equipped with individual trackers to monitor driving behaviours and speed to reduce cars tear and wear and petrol consumptions; energy efficient lighting installed in parts of their building; possible future steps to see current company car pool being progressively replaced by hybrid cars.

Elkay: formed an alliance with a specialist laboratory waste recycling company, 'Labwaste' to help customers dispose of pipette tip racks, lids and packaging: offer free collections, free storage bags or bins (volume dependent), a low maintenance recycling solution – only for tip racks that have been supplied by Elkay.

SECTION 2 – POTENTIAL SHORT-TERM PERMANENT CHANGES THAT CAN HAVE POSITIVE IMPACTS

Section 2 – Potential Short-Term Permanent Changes That Can Have Positive Impacts

1. Quick wins available through the APUC Framework Agreement (see [Section 1](#)) and through tendering

Identify Opportunities (see below) and embed them in your procurement process, such as:

- Include it in your specification - what MUST HAVE's does your contractor have to comply with
- Include it as a KPI - what elements can you and should you track?
- Make it a selection/award criteria - elements that are not MUST HAVE's but important to your requirement that may lead to suppliers standing out in their service delivery.
- Embed it in your Contract Management Discussions

2. Request from your suppliers' solutions or commitments to provide:

- Investigate opportunities in a **Vendor owned Inventory system** with your supplier or similar that allows you to reduce deliveries but secures stock to a potentially more competitive price. A Mini-Competition can assist to get the best contract in place.
- Reduce single use plastic. Substitute for glass or reusable durable plastic alternatives where possible in teaching and research - consult the suppliers for option.
- Meet regularly with your waste supplier to discuss how reduction can be achieved. Get procurement and the sustainability team involved if possible.
- Discuss services for recycling of used and decontaminated lab plastics with both suppliers and waste contractors
- Packaging/Container Take-Back:
 - Check if already available through Framework Agreement Supplier, if yes, utilise your call-off options (more information on Call-Off)
 - Investigate the upgradeability and/or modularity of new and existing equipment to attempt to prolong their life cycles and reduce the carbon required to produce new equipment along with the potential waste of disposing of the old models.

3. Consult best practice from other HEFE institutions

- **University of Edinburgh**
 - UoE has a broad range of resources on [Sustainable Laboratories](#)
 - [Single Use Plastic Guidance](#) and [Poster](#)

- [Sustainable labs consumables](#)
- **Napier University**
- **University of Dundee**

[Sustainable Lab Consumables Guide - UoE](#)

[My Green Lab Resources](#)

[12 Principles of Green Chemistry](#)

3. General Behaviour Change Suggestions:

University of Edinburgh has created a large suite of materials on Sustainable Lab Behaviour. **Posters can be found here -**

<https://www.ed.ac.uk/sustainability/staff/advice/laboratories/resources>

[Resources | The University of Edinburgh](#)

[Green Labs](#)

As a quick guide view, find on this page some short-term changes that can be achieved in every lab with some stakeholder engagement and planning. Consult and involve your procurement team to develop specification, manage your suppliers and where necessary change suppliers, to make lasting changes!

Purchase Sustainably [2]

- Make energy efficient purchasing choices and purchase Energy Star certified equipment
- Ask suppliers to remove any packaging for recycling and/or reuse
- Think before you buy: Check if you can reuse or make use of spare stock from other labs
- Host an annual lab cleanout or spring cleaning
- Manage your samples efficiently, cleaning out and labelling correctly and sectioning freezer space
- Use healthier, green cleaning products
- Explore the philosophy of Green Chemistry
- Switch to a water filtration system
- Purchase recycled content paper and paper towels
- Use GelRed/GelGreen or SybrSafe instead of Ethidium Bromide

Reduce Waste [1, 2, 3]

- Clarify lab and office recycling procedures; label bins and hang signage
- Participate in and donate to a lab freecycle
- Recycle equipment that is broken or has reached the end of its usable life. You can recycle:
 - Gloves [note this is a special waste stream - gloves can be recycled by [Kimberly-Clark](#) or [Terracycle](#)], Pipette tip boxes, Cardboard, Conical tubes, Centrifuge tubes, Pipette tips, Reagent and chemical bottles [ensure that these are clean per your institution's guidelines], Glass bottles, Ink and toner cartridges, Batteries
- Properly collect and recycle electronic waste (e-waste)
- Set up double sided printing as the default setting on all computers
- Collect water purification cartridges for recycling through takeback program
- Consider decontaminating and reusing previously 'single use' lab plastics - may be possible with existing stock for over 10 cycles, or it may require purchasing more robust and durable items which can cope with the decontamination process
- Minimize hazardous waste by applying Green Chemistry concepts to your research

Save energy [2]

- Identify materials that can be stored at room temperature and don't require a freezer space
- Defrost
- Shut fume hoods when not in use
- Label equipment with "turn me off" stickers (even the small appliances)
- Consider fitting timer plugs to various items of predictable usage, such as drying ovens, ice machines, heater blocks and water baths
- Explore purchasing an energy efficient incentivised Ultra Low Temperature (ULT) freezer
- Consider running the ULT freezer at -70 instead of -80
- Use a power strip so that groups of appliances can be powered down when not in use
- Keep appliances and frequently used equipment on a routine timer schedule
- Utilise low power modes, however, consider whether this is powerful enough for intended use

Maintain Equipment to maximise efficiency [2]

- Keep your freezers organized; by limiting door openings you will save energy and increase the life of your freezer
- Host an annual freezer cleanout to remove unnecessary samples
- Service your equipment on a routine basis to keep it running optimally and prevent breaks
- Participate in the FAS Freezer Preventative Maintenance Program to get two free cleanings and one full inspection/year
- Clear away any ice build-up on your -80 freezer with a soft cloth or rubber mallet
- Keep your -20 freezers free of ice by defrosting at least once per year and by clearing ice from the gaskets periodically

Conserve Resources [2]

- Share freezer space and equipment with neighbours instead of buying your own
- Learn how to operate the autoclave more efficiently
- Reduce autoclaving needs by introducing a two-streamed process where only required items are autoclaved and other items are run through the dishwasher
- Consider purchasing a solvent recycler for your lab space or sharing one among neighbouring labs
- Use reusable dishes in the common room/ break area
- Explore the philosophy of Green Chemistry as it may apply to your research

Source Information:

[1] <https://www.mygreenlab.org/reduce.html>

[2] <https://green.harvard.edu/sites/green.harvard.edu/files/GreenLabsGuide.pdf>

[3] <https://www.mygreenlab.org/recycle.html>

SECTION 3 - POTENTIAL LONGER-TERM PERMANENT CHANGES THAT CAN HAVE POSITIVE IMPACTS

These potential longer-term aspects may need a longer lead-in / planning time and / or liaison with other parties. This can include aspects where the CEPWG may be able to collectively represent the sector and seek change in policy, regulations etc, and if applicable, engage other sector bodies and individuals in influencing the desired changes.

1. Engage and support Glove recycling initiatives and commit to buy-in
2. Carbon efficiencies linked to individual behaviours. Need to look at making sustainable protocol changes to classes and research, encourage lab and teaching staff (see case study on ENU School of Applied Science labs plastic recycling)
3. Invest time in Training and Audits
 1. HEaTED
4. Research grants (grant agencies should make sustainability a requirement in the grant application process. So a proportion of the research grant awarded should be allocated to funding sustainability practices associated with that research project). This is being discussed by the pilot institutions of UCL's [Lab Efficiency Assessment Framework - LEAF](#) (Edinburgh, Glasgow and Strathclyde are part of pilot)
5. Equipment/asset database (to avoid unnecessary purchases)
6. Linked to WARPit, for handing over of unwanted equipment
7. Purchase of disposable or durable items made from recycled materials, to facilitate the market for recycled materials (especially plastics) and thus make more plastic recycling streams financially viable for our waste contractors
8. In collaboration with suppliers and waste contractors, identification and prioritisation of purchases of consumable items which can be most easily recyclable (especially in the area of lab plastics)
9. And identification of opportunities to change plastic types in common lab consumables to make them more easily recyclable

The University and College Sectors Supply Chain Climate and Ecological Emergency Strategy

The University and College Sectors Supply Chain Climate and Ecological Emergency Strategy, endorsed by the USECEC and the CDN-CEED, and also by the Universities Scotland Principals Group and the Colleges' Principals Group, sets out high level overall strategic approaches to addressing the Climate and Ecological Emergency across the identified seven Primary Impact Areas of Climate Change (PIACC).

The University and College sector will apply as appropriate the following activities:

- Ensure that Framework Agreements are put in place / maintained, that provide as a priority, an easy / simple cost-effective route to market for laboratory needs that enable and encourage lower GHG emission options and provide transparency over the impacts attributed to purchases under the agreements.
- Ensure Framework Agreements (where practical/desirable), include an option to take advantage of a Low-Carbon or Carbon neutral delivery/servicing/operation model. (e.g. fully managed service.)
- Encourage greater use of post-Framework activity to select a smaller volume of suppliers and to work with them to minimise the frequency of delivery events.
- Promote the use of whole-life cost & impact models in Labs procurement with focus on energy efficiency in usage (requiring suppliers to provide energy performance data where appropriate) and in end-of-life decisions. APUC will collate energy efficiency etc.
- Reduce the need to purchase new equipment:
 - o Influence suppliers to consider serviceability/upgradeability when designing new products.
 - o The operating life of instruments will be extended wherever possible.
 - o Explore opportunities for re-use/re-homing/repurposing of redundant equipment.
 - o Leverage/promote locally hosted equipment databases where they exist. Provide a platform where they do not. (using the knowledge capability derived from edam.ac.uk; WARPit; equipment.data.ac.uk etc.)
 - o Mandate extended product lifetimes by contract conditions where possible and appropriate (e.g. mandate spares availability of 7 years following EOL announcement)
- Encourage the centralised ownership / control of Lab equipment. Such a measure will enable more effective management of servicing/maintenance/operations.
- Explore and implement circular economy solutions and sterilisation services for lab equipment to reduce wherever possible the use of single use laboratory consumables and equipment.

SECTION 4 - OTHER WORKING GROUPS / ORGS THAT MAY ALSO BE WORKING ON SIMILAR WORK

1. Revival of EDAM / Link to WARP
2. STEMed - UK wide HE group
3. IUPC Gases Group
4. HVLE Group; All other UK consortia
5. My Green Lab. Contact Martin Farley at <https://www.greenlabassociates.com/> (ACT Label)
6. At ENU - Staff sustainability working group; Environmental Sustainability Governance group; Campus improvement group.
7. LEAN (Lab Efficiency Action Network) - UK wide group of individuals working in the HE sector and Research Institutions whose role involves laboratory sustainability
8. [My Green Lab](#) – a US based not-for-profit who run a lab product labelling scheme called “The ACT Label” which gives a comparative score of sustainability for various categories of lab equipment
9. [HPRC](#) - HPRC is a private, technical consortium of industry peers seeking to improve the recyclability of plastic products and packaging within healthcare
10. [Uni Green Scheme](#) – They appear to resell unused and surplus HVLE. From [their Twitter page](#), looks like they’ve been working in Scotland and with Heriot Watt recently.
11. Other lab contacts working on increasing sustainability in the lab setting:
 - York Uni ([Dr David Kuntin](#) – Biology Department Research Associate)
 - KCL (pledged to become single use plastic free by 2024)
 - Edinburgh Uni ([Andrew Arnott](#) - Climate Strategy and Sustainability Analyst)
 - St Andrews (Have a team of environmental facilitators)
 - Bristol ([Georgina Mortimer](#) – Research Technician)
 - Leeds ([Lucy Stuart](#) – Sustainability Project Officer pledged to be single use plastic free by 2023)

SECTION 5 - LINKS TO OTHER SOURCES OF INFORMATION

- [Resources | The University of Edinburgh](#)
- [Sustainable laboratory equipment metering, procurement, and operations guide](#)

SECTION 6 – POTENTIAL SOURCES OF EXTRA FUNDING

1. SALIX Funding (interest-free loan)
2. There has been previous funding rounds to drive energy efficiency in the Scottish HE sector including [Universities Carbon Reduction Fund](#) and the [Universities for the Future: Decarbonising Scotland](#)
3. Another funding stream currently open is [Scotland Recycling Fund](#)
4. SFC
5. Research Councils
6. EAUC put together a [Scottish Funding Register](#) - a lot of the funding relates to travel but possible some could apply to labs
7. [NUS Green Impact](#) - A United Nations programme designed to support environmentally and socially sustainable practice in an organisation and has a programme for Unis and Colleges (they funded glove recycling scheme Belfast Uni)
8. [Zero Waste Scotland](#)
9. For purchases at University of Edinburgh, if sustainability and cost savings can be demonstrated the purchaser can apply to the Sustainable Campus Fund

SECTION 7 – WHOLE LIFE COSTING / LIFECYCLE IMPACTS

Find information on Lifecycle Impact / Whole Life Costing, which identify and assess the social and environmental impacts as well as whole life costing factors for this area.

Life Cycle Impact Mapping + Carbon Impact

Impacts of obtaining raw materials	Impacts of manufacturing and logistics
<ol style="list-style-type: none"> 1. Possible use of conflict materials & rare earth minerals 2. Recycled content of raw materials 3. Reused materials 4. Labour Rights 	<ol style="list-style-type: none"> 1. Transport 2. Frequency of Delivery 3. Carbon offset 4. Reverse Logistics 5. Operational Energy Use 6. Packaging (recycled content, recyclable) 7. Labour rights in manufacture/production
Impacts during use of product/service	Impacts at end of life / disposal
<ol style="list-style-type: none"> 1. Energy Efficiency 2. Water Consumption 3. Lifespan 4. Consumables 5. Sterile packaging 6. Health & Safety 7. Dangerous goods 8. Maintenance (Spare Parts) 9. Adaptability 10. Reconditioning 	<ol style="list-style-type: none"> 1. Take-Back 2. Reuse/Recycle 3. Redesign/Refurbish 4. Donation 5. Avoidance of Landfill through redirecting/Diverting: <ol style="list-style-type: none"> 1. Polystyrene cooler boxes <ol style="list-style-type: none"> 1. Tradebe 2. ask suppliers for cardboard alternative when ordering. 2. Blue roll/white hand towels to compost 3. gloves recycling scheme (to be funded) or biodegradable option 4. solvent drums - use supplier with take-back scheme or donate for upcycling (e.g. planter pots) 6. Minimise harm of disposal

The [ACT Label](#) (MyGreen Lab)

The ACT label is an eco-nutrition label for laboratory products. The ACT assessment process aims to provide you with the information necessary to make smart, sustainable choices about the products you buy.

Some of the manufacturers on FA sell ACT-labelled products, such as:

- Chart
- CoolLED
- Eppendorf
- Labcon
- Micronic
- MilliporeSigma
- Priorclave
- Thermo Fisher Scientific

[Life Cycle Impact Mapping – Scottish Government](#)

[International Institute for Sustainable Development – Life Cycle Costing](#)

[Life Cycle Costing ICLEI](#)

[Life Cycle Costing – European Commission](#)

ANNEX 1 - INFORMATION ON GOOD PRACTICE / CASE STUDIES / DRAFT CODES OF GOOD PRACTICE ETC

Annex 1 contains information on examples of good practice already identified in relation to this PIACC / case studies, / draft codes of good practice etc. (or further links to them).

- A brief introduction and overview of what a sustainable lab is and why it matters ([UoE Poster](#))
- Napier University recycles Labs plastics with the support of their Waste Contractor - See **Case Study** (to follow!)
- University of Edinburgh has a ring-fenced Sustainable Campus Fund which staff and students can apply for. There are some good [case studies](#) which link to labs success stories.
- This [blog post by Tammy Gilchrist](#) discusses the challenges and opportunities of recycling in labs
- This [University of York article](#) outlining they are taking to tackle lab plastics
- There is a labs project implemented at Uni of Reading and funded by Salix which has a case study [here](#)
- LEAN (Lab Efficiency Action Network) (including UoE) have created a [Sustainable laboratory equipment metering, procurement, and operations guide](#)
- [Market Assessment of Energy Efficiency opportunities in Labs](#)
- **University of Edinburgh - Case studies/Best Practice**
 - [Lab Equipment](#)
 - [Freezers](#)
 - [Ventilation](#)
 - [Cold Storage Sustainability Project](#)

ANNEX 2

Annex 2 contains information from the Responsible Procurement Guides in relation to carbon reduction:

Materials Scarcity and Security

Development Stage

Think about impacts on sources – are any items involved in the process devolved from rare materials or volatile supply chains? Can an alternative products or materials be sourced or one who's production and processing carries less impact?

In regard to Lab Gases, encourage usage of products using readily available gas products rather than commonly used, yet scarce ones. Further, encourage Institutions to discuss plans with Contractors at the earliest possible stage of procurement to ensure availability of gases.

Tender Stage

Ask suppliers whether any products (or those used within production, processing or delivery) are derived from non-renewable or vulnerable sources. Ask how they minimise or mitigate the associated risks.

Contract Stage

Challenge suppliers to demonstrate how they are addressing responsible sourcing of products and materials and avoiding products derived from potentially vulnerable sources.

In the case of laboratory gases, work with Contractors to minimise disruption to Institutions in times of shortage. Liquid Helium is the most often scarce product which is used in a non-replaceable way in research and clinical environments.

Climate Change

Development Stage

Consider how **less energy intensive methods of science** can be leveraged to produce the same results. E.g. could the research be modelled? Could you use a Colleague's chemicals or Sundries rather than ordering a brand new batch?

There are various systems in place in the sector to enable **equipment sharing**.

Consider current practices as well as possibilities in reducing delivery frequencies for consumables or consider a local store.

Research low carbon products available – especially those with a high recycled content.

Tender Stage

Production and use of laboratory equipment can be very energy (and consequently very carbon) intensive. Ait also tends to be delivered by road. Ask suppliers what they will do to **minimise Carbon and Green House Gas emissions** in production, distribution and use looking for information on:

- Energy consumption in the use phase (e.g. emission of GHG emissions)
- o Purchase energy efficient equipment
- o Purchase equipment with low power mode
- o Purchase equipment supplied with green performance management instructions
- o Purchase equipment with a metering device
- o Ensure the appropriate and energy efficient functioning of the equipment through a needs' assessment and the provisions of training on energy efficiency

Some equipment types will use considerable amounts of energy in their operation. Consideration should be given to utilising a **whole-life-costing approach** to commercial appraisal to favour energy efficient equipment.

Can reuse or purchase of refurbished products be considered?

Ask suppliers how they are lowering carbon in their operations.

Contract Stage

A typical Institution will be receiving many deliveries from different suppliers every day. Consideration should be given to **consolidating deliveries or consolidating suppliers**. Could you operate more effective, efficient systems which meant you could consolidate deliveries? Could you operate a single supplier arrangement and receive deliveries once a week to limit delivery miles?

Some equipment types will use considerable amounts of energy indirectly in the form of **consumables**. Think about what level of consumables will be required through the life of the equipment.

Waste Production

Development Stage

Consider **computer modelling** rather than purchase or engaging in particularly energy-intensive manufacturing processes.

Seek to re-use equipment. Can you secure the equipment you require from another Institution or from a colleague form within your own Institution to remove the need to purchase?

Many consumables are typically viewed as disposables and enter waste streams following use. There are re-usable products available and should be explored with suppliers and stakeholders.

Tender Stage

Apparatus will frequently be manufactured overseas from widely recyclable materials. There will be wide use of plastics and the energy used in manufacture will be high. Ask supplier what they will do to **minimise use of virgin material and increase recycling.**

Contract Stage

Think about what **recycling schemes** are run by Manufacturers which can be taken advantage of.

Lab equipment typically has some value upon reaching the end of its useful life in an Institution.

Opportunities can be sought to **re-sell the equipment** or to offer it up for **re-use** by another Institution or to re-sell. A Framework Agreement is in place to put Institutions in touch with Suppliers who can provide this service.

What will be done with waste products following research? Ensure it will be disposed of in accordance with **prevailing statutes / best-practice guidelines.** Seek out exemplars from within the sector to identify opportunities to improve the waste management within your Institution

Hazardous Materials/ Emissions

Development Stage

Radiochemicals: is there a genuine **need** for the radioactive substances? Can these be **substituted** by computer modelling?

Tender Stage

Typically hazardous materials and contaminated waste will require collection by specialist waste handlers and transported by road to a specialist storage site. Ask suppliers how they intend to address this.

Contract Stage

Be aware of storage and disposal requirements of everything that is being bought. Many chemicals require specialist, expensive disposal, the costs of which are often not considered until the time of disposal. Many pieces of equipment will be covered by disposal legislation such as WEEE or RoHAS.

Tender Stage

Ask suppliers what they do to promote water efficient production processes and water recycling.