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Sustainable Laboratories Steering Group (SLSG)

"Supporting World Class Laboratories"

Tuesday 17 November 2015, 12.30pm

Elder Room, Old College

AGENDA

Members:	Andrew Arnott; Graham Bell; David Brook; Michelle Brown; Martin Crawford; Valerie Gordon; Dave Gorman; David Gray; Sharon Hannah; Angela Ingram; David Jack; Andy Kordiak; Julia Laidlaw; Sandra Lawrie; Stewart McKay; Brian McTeir; Caro Overy; Janet Philp; Fleur Ruckley; Candice Schmid; Graham Thomas
In attendance:	Dean Drobot, Rabbab Oun & Alaine Martin, University of Strathclyde
Apologies:	Michelle Brown; Andy Kordiak; Janet Philp

1 Welcome, Introductions, Purpose and Aims of Meeting
The Director of SRS will outline the programme for the session

2 Minute **A**
To *approve* the minute of the previous meeting on 2 June 2015

3 Matters Arising
To *raise* any matters arising not covered on the agenda or in post-meeting notes.

SUBSTANTIVE ITEMS

4 S-Labs Conference September 2015 - Leeds **B**
To *receive* a briefing on findings and developments from the S-Lab Conference 2015 from the Programme Coordinator – Laboratories

5 Lab Refurbishment Presentation
To *receive* a presentation from representatives from the University of Strathclyde on lessons learned from lab refurbishments

6 SLSG Implementation Plan **C**
To *receive* an update on progress against the Implementation Plan from the Programme Coordinator – Laboratories

7 Breakout Session – Long Term Strategic Priorities & Future of the Group
The Programme Coordinator – Laboratories will facilitate a Group break-out session to *discuss* 3-5 year objectives and targets for lab sustainability including evaluation of the Group so far, reflection on its remit and next steps

8 Labs Business Case **D**
To *note* and *approve* a paper from the Programme Coordinator – Laboratories

9 Funding for Sustainable Laboratories Role
To *note* a verbal update on funding scenarios from the Director of SRS

10 Climate Strategy Review, Utilities Project & Sustainable Campus Fund Update
To *note* an update from the Engagement Manager on the Climate Action Plan, utilities targets and potential for a Sustainable Campus Fund.

ROUTINE ITEMS

11 Thematic Workshops & Utilities Working Group meetings **E**
To *receive* an update and action log from recent Labs Workshops on Lab Design, Utilities and CPD, a Utilities Practical Planning meetings.

12 Any Other Business
To *consider* any other matters from Group members.

A

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MINUTE OF A MEETING *of the Sustainable Laboratories Steering Group held in Room 1.09, Main Library, George Square on Tuesday 2 June 2015.*

1 Welcome and Introductions

The Convener welcomed attendees to the second meeting of the Group, including new member Graham Thomas, Director of Central Bio-Research Services (CBS). The meeting would focus on the draft Sustainable Laboratories Implementation Plan 2015; identifying where support was required, building an evidence base and business case.

2 Minute **A**

The minute of the meeting held on 27 January 2015 was approved as a correct record.

3 Matters Arising

Action – All to email the Secretary with any suggestions for a research student to join the core group.

SUBSTANTIVE ITEMS

4 Utilities Efficiencies & Role of Lab Managers/Heads of School

This presentation was carried forward to November's meeting.

Action – GT to update the Group in November.

SLSG noted ongoing review of the University Climate Strategy. Despite the efforts of a wide range of staff, UoE was not on track to meet its climate emissions targets, due to growth and intensification of activities. Estates and SRS were aiming for a 10% energy saving across the University from business as usual and labs had a significant role to play. Metering, though costly to install, could provide the data required to identify opportunities to make spend-to-save investments. SLSG recognised that targeting metering was a key tool in developing a business case, and not an end in itself.

There is an aspiration for a larger central fund which would operate with clearly defined parameters, would incentivise energy saving investment in labs and could roll out improvements across the board. Subsequent discrete projects could be funded from savings within these processes. SLSG acknowledged that universities by their nature were well placed to afford to invest for the long term.

5 SLSG Implementation Work Plan 2015 **B**

The Programmes Facilitator – Laboratories introduced the Implementation Plan, updated to include comments received at the previous meeting and subsequent input from Estates. Like the Group, the Plan was designed to steer action towards embedding sustainability within laboratories at UoE. The bulk of these actions would fall to the Programmes Facilitator – Laboratories role, though support needs from some areas had been identified as key to moving the Plan forward.

Activities had been grouped into areas identified at the first meeting:

'A. Evidence Building'

Evidence building was ongoing (detailed in Paper D), with an initial focus on energy as having the greatest cost and environmental impact. Work would be also done around water, waste and chemical substitutions to reduce hazardous waste arisings.

‘B. Training and Engagement’

Connections had been made through Val Gordon to the HEaTED network in order to better understand the needs of technical staff.

‘C. Utilities and Waste Efficiencies’

This section comprised the bulk of efficiency implementation plans, requiring a business case to make financial savings quantifiable.

‘D. Outreach and Securing Funding’

The Labs Facilitator role was funded for 12 months. If the Group agreed that this sustainable laboratories work was valuable, it could look to various funding opportunities such as the Scottish Funding Council and the Universities Scotland Efficiencies Taskforce to extend that. Zero Waste Scotland was also identified as a potential funding source.

‘E. Estates Design and Construction’ (in collaboration with Estates Development)

Since the document was produced the Labs Facilitator had been invited to have input into the Darwin refurbishment. It was hoped that consultation at this key stage would continue in future projects.

SLSG approved the contents of the Implementation Work Plan.

a) Update on progress against the Plan **C**

SLSG discussed the progress analysis report on the Plan so far (Paper C), which used a traffic-light system (RAG) to indicate progress against objectives. The report would be updated and shared with the Group on a quarterly basis.

Objective: Evidence Building

Development of an evidence base was on track, with particular progress being made on fume cupboards. Conversion to VAV at Joseph Black could yield substantial savings – further quotes were awaited. The Roslin freezer study continued to make progress. This 5 year project was an excellent asset for the University to demonstrate energy savings and identify which samples could run at higher temperatures. Depending on risk appetite, it would soon be possible to act on these findings. Different timescales were relevant to different labs and lab users, some requiring long-term stability, some not keeping samples beyond 6 months. The energy savings were already clear, tests for degradation were repeated every 6 months and the evidence would grow stronger as the project progressed. The main issue would be culture change for labs users, who may have been storing samples at -80 for their whole careers. Further thought would be given to the roll out and messaging to ensure it came from a trusted source. All UoE freezers had variable capacity so no additional expenditure on infrastructure would be required.

Objective: Training & Awareness

The Labs Facilitator was working on a guidance document on exit procedures, including ensuring that samples were not left in storage unnecessarily and that poorly labelled chemicals were not left to be disposed of as hazardous waste. Most labs represented at SLSG did have robust procedures in place. This document, which would be available on the SRS website, was designed for those labs the Group did not have regular contact with.

Action – AA to check that the guidance document on exit procedures emphasised that a recycling strategy should be put in place to deal with old equipment.

Members recognised an issue with staff not feeling empowered to get rid of old equipment, however redundant, particularly if it had been expensive. There was a danger of WARPit accumulating out of date equipment. If the science had moved on, no one else in the University would want these items. There were opportunities in this area for UoE, or a social enterprise, to look at shipping equipment overseas. Equipment that was extremely energy inefficient would not be cascaded. It was proposed that space be set aside for a central dead store, organised through WARPit, to hold old equipment so that it could be properly maintained and covered by a single insurance policy. Procurement were working on a centralised asset register, though this had not yet been fully rolled out as an operational tool.

Discussions were ongoing on induction processes and alignment with other SRS activities. A lot of labs represented at the Group did include SRS elements in inductions, but this was piecemeal and varied according to the lab management. It was important to get a clear and consistent message across to technical staff at the start of their careers. Engagement with the HEaTED network was ongoing and HEaTED would be included in the Labs Workshop on training and development planned for 10 November 2015.

The Labs Facilitator was engaging with staff in GeoSciences to identify improvement opportunities and encourage the school to take part in the Lab Awards which were a useful tool in prompting action. Having conducted a walkaround, the Facilitator confirmed that a lot of the same messages applied to GeoSciences' lab space as would apply to a lab in Biology or Chemistry. The Group discussed what constituted a lab and how definition affected the areas to target. The Facilitator would investigate further and pursue widening engagement as far as practical, initially aiming to make connections with the School of Engineering.

Action – AA Draft document to be circulated.

Action – All to email the Secretary with any obvious gaps or areas where cover was light, as well as any suggestions for a representative from KB campus.

Objective: Utilities Efficiency

Once comments on the evidence had been received, decisions would be made regarding which case studies to publish on the web. Best practice for air handling systems identified during the Lab Awards was being drafted. Proposed events, case studies, induction and guidance documents would be circulated to the Group for views before being published.

Action – JR to circulate documents for comment including proposed workshop topics.

The opportunity to make an improvement by diverting non-hazardous consumables from landfill had been discussed at the labs workshop. SLSG noted the rising preference for disposable single use items. Items that were washed and autoclaved could be more damaging to take on board (generating Scope 1 or 2 emissions) than waste (Scope 3).

Action – AA to investigate and report back on the relative figures.

A similar move towards disposables had been noted in Accommodation Services, following life cycle analysis and factoring in the cost of staff time. The key was to recognise areas where the culture had moved on or benefit was marginal and focus on making intelligent evidence-based interventions where it mattered.

Objective: Securing Funding

SLSG noted potential funding opportunities through Zero Waste Scotland and initial scoping work was underway. Over the last three months a small scale research project funded by ZWS had been carried out with GeoSciences, the Business School and the School of Chemistry on zero waste business opportunities and there may be scope for further projects. Concerns were raised regarding materiality issues around energy and utilities savings versus potential proposals to ZWS which would focus more on circularity in procurement and waste and resource efficiency. It was not anticipated that the Scottish Funding Council would be in a position to offer funds in the near future. Martin Kirkwood, SFC Deputy Director, had been approached with a pitch to replicate S-Labs in Scotland. While broad agreement had been secured, SFC had no funds available to support this in the short term. A scoping proposal would go back to ZWS – the Energy Manager, Estate Development Project Manager and Roslin Campus Facilities & Services Manager agreed to act as a sounding board in advance of the submission. Any leads from members on potential funding sources or avenues to make a business case were badly needed at this early stage. When work was more established it should be self-sustaining.

Action – All members to contact the Secretary with suggestions for alternative sources of funding.

Objective: Sustainable Design

Improvements at the design stage were recognised as more effective than retrofitting. The S-Labs project was developing design guidelines. Currently at draft stage, these were expected to be in publishable format by September for the Annual Conference. Guidance would take the form of a checklist of lab-specific design questions, and, reviewed with Estate Development and academic staff for a UoE-specific context, would provide valuable continuity across the estate. Guidelines would allow bespoke elements as long as a need could be demonstrated.

Action – AA to circulate guidelines to the Group once available.

6 Findings From Building a Body of Evidence and Case Studies **D**

SLSG noted the evidence base summary so far, which focused on energy opportunities, intended as the starting point for an investment business case to the University.

Cold Storage

Members noted potential savings on freezer plug loads and air conditioning energy consumption. At Roslin a lot of natural air ventilation ensured combined energy usage was lower, compared to research laboratories in the basement of the Chancellor's Building. This was another vital issue to address at the design stage. Overall sample management was good, with a number of areas looking at reducing stock and throwing out samples that were not needed. The focus should be on the expanding fleet of freezers (each of which could cost £1K p.a.). There was a difference of around £400 in the operating costs of an old versus a new freezer unit.

Ventilation

Replacing constant volume with variable volume fume cupboards would save on energy costs and afford quick payback. By dropping the flow rate by 40%, the University of Nottingham saw a 40% reduction in energy costs. Old electric humidifiers in animal labs could be replaced with modern gas equivalents with much lower running costs. Where facilities were using the CHP the normal cost difference did not apply and it was sometimes better to run on electricity rather than gas. Through the Estates

review process facilities had been identified where the plant was at a point of needing to be replaced or refurbished. Demand based ventilation would be especially useful in areas with 24 hour or varied access, though capital and maintenance costs would need to be offset. It was unclear who had the authority to make a change in rates, there was a variety of conflicting legislation from different bodies, and a tendency in these cases to default to the higher standard. Further discussion and investigation was needed to unpack the issue.

Cold storage and ventilation offered major savings but also required significant investment. Estimated payback periods had been included in the table in Annex 1. For projects with short payback periods and modest costs there was no reason not to go ahead unless it impacted on the science. The main focus would be on major projects (fume cupboards, freezers, drying ovens). For some of these improvements there would also be benefits in terms of staff comfort. It was important to take a long term view and not commit to small projects that would later be made irrelevant by larger initiatives (e.g. fitting timers to drying ovens and later deciding to remove the old ovens). Controls should be put in place to ensure projects delivered on their payback. A case could be made at Investment Committee, which was putting increasing amounts into the endowment for limited return.

Members recognised the value of the evidence base in changing behaviours, and felt that all the improvement schemes outlined were achievable and on the right lines. Over the next few months it would be evolved into a plan that, after a couple of iterations, members could sign up to, and that could be used as a basis for discussions on investment, and for potential roll out in the Schools.

ROUTINE ITEMS

7 Thematic Workshops **E**

SLSG noted the minute of the first Labs Workshop focused on procurement and waste. The Purchasing Manager, Roslin Institute had presented an update on progress with the labs consumables contract in relation to waste minimisation. The Waste and Environment Manager had presented on the challenges, successes and future strategy for lab waste minimisation and the SRS Projects Co-ordinator had presented on the WARPit reuse portal, which had consolidated pre-existing pockets of reuse into a more visible, measureable system. Strategic approaches and practical actions proposed included: negotiating with suppliers to reduce packaging; providing additional training and guidance for lab users; continuing to expanding WARPit; promoting eStores to consolidate purchasing and deliveries; carrying out audits to identify and expand the most progressive recycling and reuse contracts across the estate; negotiating on packaging as a sector through EAUC and S-Lab; looking to internal academic expertise for alternatives to polystyrene for temperature controlled transport; taking a strategic approach to leasing versus purchasing; and repairing items, including HEaTED workshops and CPD for technical staff.

The next Labs Workshop on 16 June would focus on design guidelines.

8 Any Other Business

SLSG agreed to an additional meeting in late September, after the S-Lab Conference.

Action – JR to find a suitable date.

***Post-meeting note**: SLSG would meet on 29 September from 9am in Room 1.07 at the Main Library.*

Sustainable Labs Steering Group

17th November 2015

S-Lab Conference September 2015 - Leeds

Description of paper

This paper provides an overview of the findings and observations made by the Programme Coordinator – Laboratories during his visit to the S-Lab annual conference which took place in Leeds in September 2015.

Action requested

SLSG is asked to note the findings of this paper.

Recommendation

No specific recommendations at this point – this paper gives an overview of discussions. The SLSG is encouraged to consider if any of the findings from these discussions could or should be implemented at UoE.

Background and context

S-Lab ("safe, successful and sustainable labs") is an influential international organisation which runs training and conferences on lab sustainability. It is recognised as a leader in the field of gathering and disseminating evidence on lab sustainability. Building on previous work by organisations in the USA, especially Lab Rats, S-Lab is currently HEFCE funded.

The annual conference of S-Lab is attended by c.600 delegates. As the organisation is currently UK based, and the conference was in the UK, the majority of delegates are from the UK. However, a sizable minority of delegates were from further afield including various locations in mainland Europe, USA, Canada, Australia and New Zealand.

Discussion

Overview and general summary

The conference gave a great opportunity to meet with other lab sustainability practitioners across the UK and learn from our experiences. Subsequent to the conference an S-Labs 'google group' has been set up for labs sustainability practitioners with representatives from (currently) Edinburgh, King's College, Bristol, Manchester and Strathclyde. This has been an active forum for Q&A, knowledge sharing and avoiding 're-inventing the wheel'.

The calibre of delegates meant that the discussions I had with delegates in between formal sessions were as useful as the learning in the formal sessions. There was a great range of experience to draw from in the room.

There was also a lot to be gained from some of the formal sessions, where delegates could learn about technical details, strategic approaches and further opportunities for making sustainability improvements within labs (summary highlights detailed in this document).

Attendees from UoE were:

1. Andrew Arnott (SRS)

2. David Somervell (SRS)
3. Ron Brown (CSE)
4. Brian McTeir (CMVM)
5. Dawn Windsor (CMVM)
6. Bob Fleming (CMVM)
7. Heather Anderson (CMVM)
8. Stewart McKay (CMVM)
9. Angie Ingram (CMVM)
10. Margaret McLean (CMVM).

Other attendees from the HE sector in Scotland included:

- Heriot Watt = a Project Manager from Estates
- Glasgow = a Lab Manager, and the Head of Technical Services for Chemistry
- Strathclyde = a Facility Manager and the S-Lab Coordinator (within Building Services)
- Aberdeen = Assistant Director - Estates, and a Project Manager from Estates.

From this we can see that UoE was better represented than any other location in Scotland. Good to continue to encourage Estates colleagues to attend in future years.

Further opportunities for improvement include the attendance of a representative from SFC (who were on the judging panel for the awards) and the representation of more Scottish HE institutions in general.

Resource implications
Limited resource implications on top of other existing plans. The information provided here should help steer our actions and provide further evidence to support our decisions.

Risk Management
Limited risk associated – all of the information provided is from case studies where the actions have already been successfully implemented.

Equality & Diversity
No implications for Equality & Diversity in this instance.

Next steps/implications
The SLSG is asked to note the findings and information included in this document and use it to help inform future decision making.

Consultation
This paper has been reviewed by Head of SRS Programmes, and SRS Programmes Manager.

Further information
Author & Presenter
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October 2015

Freedom of Information This is an open paper.

Appendix: Conference summary notes

Contents:

Exhibitor notes*:*

Genlab E3 drying oven = c.£1,100 (standard price – would expect to negotiate down substantially for a bulk buy). Bristol recorded a 60% energy saving.

Keynote: Kim Toufectis – NASA, Louise Ellis (Head of Sustainability at UoLeeds) and Tom Stanway of Astra Zeneca

“Facilities are for people. If you’re in the facilities business and you don’t realise you’re in the people business, you’ve missed the point.”

We have to challenge the idea that recognising status requires more space and more stuff.

Focus on the importance of communal spaces in new buildings where people from different areas of science/different departments can meet (have to meet – e.g. corridors/stair wells) in order to encourage collaboration which is vitally important to progressing science.

- Asking (or compelling in AZ case) scientists to work with less lab space and share equipment leads to collaboration which leads to better science
- Some resistance to this…
- Resistance overcome by top-down vision and bottom-up perception (CEO + 2 heads of R&D sponsoring)
- Benchmarking standards drawn from exemplar places in USA
    - 13m2/researcher lab space, 6m2/write up space (both excluding space for core facilities/plant)

Flexible lab space is very popular and has received great feedback for new labs – services provided via the ceiling assist with this.

Environmental improvements in Biology: Jo Hossell – UoYork

- Use HH energy data to develop “hotspots” mapping (via Systems Link, but can be easily done on Excel)
- Voltage optimisation (8% saving)
- Inverters on pumps for chilled water, hot water and AHU (£4k saving)
- Use power meters to identify high using equip
    - Replace 50 old inefficient ULT freezers

        - UoY bought the freezers (not owned by individuals) and wrote up conditions for use (i.e. defrost and maintenance regularity. Which samples could be stored)
- LED in glass houses/growth rooms/growth chambers
    - Proved there is no negative impact of LED on growth
- Timer clocks on drying ovens = £605 saving
- Corridor lighting controlled by PIR motion sensors
- Heat recovery from extract systems.

Lab equipment: Andy Evans – VWR

- Drying ovens typically last for 15 years
- So a saving of £300/year equates to £4.5k total lifetime saving (assuming energy prices stay the same…)
- Consolidate equipment into fewer, larger units for energy savings
- Tips need to be dried at 40^0C max or they will warp
- Don't dry items on the bottom of a drying oven, it interferes with the thermostat and causes excessive 'cycling'
- Andy has written some standards for specifying equipment purchases
- Andy has done calcs which can be used in business cases
- Samples of equipment can be borrowed from VWR for trials
- ULT Freezer door opening for 10min raises temp 7-10^0C
- Glasswashers can have drying cycles – do not use, not efficient.
    - Also these models have more elements than those without drying cycles, so need more maintenance and cost more to buy initially
- Identify the key component parts of your equipment and specify high quality parts when writing a procurement specification
- Ask suppliers about any 'consumables' connected to the kit – are they generic or are you locked in to buying the item from one supplier (i.e. like cheap printers with expensive ink cartridges)
- Is the item completely recyclable?
- Are there any hazardous materials in the item?

Rotary Evaporator (new design): Peter Gowin – KNF

- Wireless remote control so can operate the RE within a fume cupboard with sash down
    - But do REs need to operate within FCs anyway? There shouldn't be any release of fumes.
- Smaller bath so the liquid (oil or water) heats up faster and uses less energy
- Timer function so will switch off if not in use for a while
- Feeder cables/tubes integrated into body of machine so less likely to knock something over
- Can be coordinated with the KNF vacuum system (SC920) to sense the evaporation point of the liquid and adjust the vacuum pump accordingly
- Easy to disassemble for maintenance – cheap replacement seals (£19 instead of £100)
- Won a 'red dot' design award in 2014 (4,800 applications)
- If power cut the flask will be lifted out of the bath to stop excess evaporation
- List price c.£3,000 – discounts for bulk buy and introductory offers.

Chemical Substitution: Avtar Matharu + Glenn Hurst (UoYork)

- In teaching and assessment of practical lab skills for students we need to look beyond % yield, or number of grams/ml of a particular product made by the student
    - As the products all need to be thrown away after the practical/exam anyway, adding to waste costs (as well as purchase costs for constituent chemicals)
- 2 websites to look for substitutes for chemicals (less hazardous)
    - SIN (Substitute It Now) http://chemsec.org/what-we-do/sin-list
    - SubsPort http://www.subsport.eu/

Better Communications: Kim Toufectis – NASA

3 groups of people in and around labs: Researchers, "Stewards" (i.e. estates/SRS) and Budget Holders

- Rearchers define their needs
- Stewards devise action
- Budget holders secure funds

Is the message becoming altered/garbled between researcher and budget holder?
Stewards rarely talk about the different options we have for physical infrastructure:

- Acquire
- Operate
- Sustain
- Adapt
- Renew
- Divest

Major investments are intermittent

- Often the people who designed the original building have retired and their 'culture' is unknown to us
- Renewing (substantial renovation) can cost as much as acquisition
    - c.60% - 120% of asset value

Budget holders often say 'I wouldn't pay that in my own home'

- They think the price is inflated
- So need to discuss
    - Labs are not your home!
    - Homes sometimes are totally renewed (e.g. historic preservation – keep outer shell but change inside)
    - But often are knocked down and rebuilt (especially in USA)

Ask them "do you still drive the same car you drove to get to your first full-time job?"

- No, you replace. Because of…
    - New features/technology
    - Change of your requirements
    - Change of number of passengers
    - Change of size/type of cargo
    - Quality declines with time & use
        - Breakdowns = downtime
    - Adapting an existing asset may not be the best option
        - Willing estates colleagues will agree to do it but it may be a 'bodge job' to keep a building going which logically should be knocked down.

    - Tom Yearley (KCL and formerly Reading) had a good experience making use of the expertise of academics from the Building & Construction School, as well as in Psychology to help design new buildings.
    - However Helen Stevenston (York) found that academics were too abstract & not practical enough
    - Need to try to make new buildings/refurbed labs generic enough so can accommodate a wide range of equip/uses, but without spec'ing up to provide services for all possible uses
    - Equipment sharing via equipment.data@ac.uk

Equipment sharing: Christopher Wilkinson – UoCambridge

- SES Consortium of 5 uni's in South East England
- They all publish facilities/fixed assets they are willing to share onto a website (equipment.data@ac.uk)
- Some concern from people who feel they are 'owners' of the equipment about potential misuse of the equipment, so they have a range of options:
    - Don't allow any access to your equipment
    - Agree to run the experiments for other people
    - Allow other people to use the equipment supervised
    - Allow other people to use the equipment unsupervised after training
- Benefits:
    - Equipment sharing is a requisite for research grant proposals over £134k (OJEU)
    - Sharing provides researchers with access to back-up equipment, reducing down-time
    - Better research and collaborations
- If have lots of equipment from the same supplier, try to arrange an O&M contract for the whole lot, rather than each individual item (e.g. Leica)

Lab refurb (Joseph Black – Medicinal Chemistry): Graham Tobasnick – UoGlasgow

- Recirculating chillers don't produce a huge carbon saving (as mainly save water) but do give an improvement to science as can operate at lower temperatures because use antifreeze rather than water.
    - Temperature is better controlled
    - Reduced solvent vapour released
- "Findensers" give a good payback (running for 4h/day)

Effective & Efficient Sterilization (autoclaves): Colin Hartop – ESTS

- Air removal is key to the effectiveness of sterilization, otherwise pockets will remain and the steam will not penetrate to all the surfaces
- Non-Vacuum type
    - Works by rising steam displacing air
    - If items not positioned exactly right the sterilization process won't work
    - Long cycles
    - Glassware comes out sterile but wet
    - Not suitable for bags of lab waste
- Vacuum type
    - Pulses of steam + pressure

    - Removes all air
- Must ‘validate’ your autoclave to check it is actually achieving the temperatures and pressures required for the required length of time during the cycle. Ask the manufacturer/commissioning officer if they can speed up the cycles during installation.
    - Calibration and validation 6-12 monthly
    - Maintenance 3-6 monthly
- Use metal trays rather than plastic – quicker cycles
- Segregate wastes – fluid waste takes a long time (2.5h), so other types of waste should be done separately as they don’t need nearly as long (1h).
- Don’t tie the tops of waste bags too tight – air cannot escape easily enough
- For large machines (over 600litres) use mains steam from a specific steam boiler rather than an autoclave with an integral steam generator – more energy efficient.
- Logiclave with Integral Steam Generator – S-Lab award
    - 10kWh for half hour cycle
    - No insurance inspections as doesn’t have a pressurised vessel
    - Estimate £2k/yr savings
    - Only runs on demand.

Joseph Black Chemistry Labs refurb: Ron Brown – UoE

- Using chillers rather than mains-to-drain saves 500m3 water/yr = £1,000/yr saving
    - Also improves science (see talk from Graham Tobasnick)
- Make-up air coming in through low velocity socks
    - This is required when operating low face velocity fume cupboards

Challenging Lab Norms: Martin Farley – KCL

- Used power meter to identify items to put onto timers
    - Need to work with users otherwise they’ll just unplug the timer plug
- Endo-cube flattens out the temperature sensed internally in freezers, so reduces cycling (improved lifespan and energy savings)
- Developed a ventilation policy so contractors don’t only check FC face velocity can exceed 0.5m/s but rather that the face velocity is appropriate (i.e. a FC with face velocity of 0.8m/s would be ‘approved’ by the old method, but would be energy inefficient and potentially less safe)
- 2 types of waterless condensers now (Findenser and Assynt) – KCL are trialling them in a lab to assess functionality (and energy savings?).
- Is there a need for cold rooms now?

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Social Responsibility and Sustainability

Sustainable Labs Implementation Plan progress update

28/10/2015

Prepared by **Andrew Arnott** for

Sustainable Labs Steering Group core meeting

This document is intended to give an update on progress against the objectives of the Sustainable Laboratories Implementation Plan, which was drawn up to provide a structured approach to improving sustainability within laboratories at the University of Edinburgh in 2015. A traffic-light system (RAG) has been used to communicate quickly and clearly the progress which has been or is being made. In general this is taken to mean: green = on track, amber = delayed or problematic, red = objective is in danger of not being met. Further details on the progress against each individual action is included within the comments column. This document will be updated on a quarterly basis and shared with the Sustainable Laboratories Steering Group at Core meetings.

Overview of the Sustainable Laboratories Implementation Plan 2015

Area	Objective	KPI	Progress (RAG)
A. Evidence Building	To gather, collate and develop evidence and data on the effectiveness and consequences of various opportunities for efficiency improvements.	*Number of topics for which a body of evidence has been produced and made available to SLSG.* 3 major topics: Ventilation, Cold Storage and Lab Equipment (which contains a number of sub-topics) covered.	
B. Training and Engagement	To increase knowledge and awareness of sustainability actions among laboratory users.	*Number of communications (events/presentations/talks/meetings/distribution of materials) between Programmes Coordinator - Laboratories and key laboratories personnel.* In 2015 the Programmes Coordinator – Laboratories has run 3 topic-themed “Labs Workshops” on Procurement and Waste, Efficient Labs Design, and Utilities Saving. Each workshop was attended by c.15 - 25 people.	

		New labs engagement materials have been distributed to 9 labs contacts around the University of Edinburgh. 10 labs teams took part in the UoE Sustainability Awards, and representatives from these teams attended a de-brief meeting to discuss best practice. Induction presentations have been booked at 2 labs, and further labs will receive a copy of the power point presentation to incorporate into their existing practices. The Geosciences department has become a key contact for lab sustainability when previously they were not in contact with the Programmes Coordinator – Laboratories. 3 meetings have been held with these contacts, including a walk-around survey to identify opportunities. Improved regularity of contact has been established with key contacts in the Engineering and Physics departments, as well as SCRM building, who also were not previously in contact with the Programmes Coordinator – Laboratories.	
C. Utilities and waste efficiencies	Identify and enable utilities efficiency improvement projects throughout the university.	*Number of utilities efficiency improvement projects implemented. (Cost and carbon savings quantified where data is available).* No utilities efficiencies projects have been implemented yet but a fume cupboard retrofit project at Joseph Black is being scoped out, and quoted savings amount to £60,000 annually, and payback periods could be c.3 years. The imaging centre at IGMM is developing a business case to access funding for 15 LED microscopes, which would deliver cost savings of c.£8,000 annually and a payback period under 5 years (along with improved health and safety from reduced mercury).	
D. Outreach and Securing Funding	To secure funding to support the continuation of sustainable laboratory work within the	*Amount of time the sustainable laboratories work is supported for after January 2016.* Currently support has been extended to end of July 2016. An application for further funding is being made with ZWS for 3 years. In addition discussions are ongoing with SFC in relation to a collaborative “Scottish S-Labs” programme.	

	University of Edinburgh.		
E. Estates Design and Construction	To ensure sustainability concerns are embedded within the processes of estates design and construction.	*Level and frequency of input from SRS into estates design and construction.* SRS have attended 6 workshops/meetings on the Darwin Tower redevelopment, as well as 2 consultation on the Bioquarter/Institute for Regeneration and Repair. Invites for several more meetings in these developments have been extended and accepted.	

Detailed review of the Sustainable Laboratories Implementation Plan 2015

Objective	Progress (RAG)	Tasks	Comments (August 2015)
To gather, collate and develop evidence and data on the effectiveness and consequences of various opportunities for efficiency improvements.		Assess fume cupboards for suitability for Variable Air Volume (VAV) conversion	Two contractors visited Joseph Black labs to quote for conversion to VAV. The initial quotes were not easily compared so we had to develop a specification and ask them to re-quote based on that. We have since received one of the re-quotes and are awaiting the other. Initial indications of c.£1,000 savings per fume cupboard (25 no.) were given by both suppliers, so costs of up to c.£75k would equate to a 3 year payback period.
		Investigate potential energy savings and risks to samples associated with raising the temperature of ULT freezers.	The freezer study at Roslin was delayed while trying to find financial support to cover higher-than-expected assay costs. This support has since been provided by Val White at Roslin and the project is back on track and will soon be ready for legal sign-off. Parallel to this, a small number of lab users/managers are now also turning freezers down to -70°C of their own volition prior to any results from the freezer trial as a result of growing awareness of the energy savings available and growing criticism of a standardised approach of operating at -80°C.
		Investigate potential energy savings and risks to samples associated with changing	Energy savings and supporting studies have been identified and included in the Evidence Base document.

Objective	Progress (RAG)	Tasks	Comments (August 2015)
		DNA/RNA storage methods to room temperature. Compile a body of evidence and case studies relating to sustainable laboratories actions undertaken at other institutions. Conduct a trial/pilot project monitoring the impact of distributing 'switch off' stickers and other communications materials.	Three 'case studies' documents have been produced outlining good practice in UoE and also at other leading HE institutions for the areas of cold-storage, lab ventilation, and lab equipment. As a result of the reduced resources available in the communications team at SRS the trial/pilot project to attempt to monitor the impact of 'switch off' stickers has not yet happened and will be substantially delayed.
To increase knowledge and awareness of sustainability actions among laboratory users.		Develop a core list of sustainability criteria to be covered in induction and exit processes and disseminate this to laboratories. Host an event with HEaTED and S-Lab to focus on professional development of laboratory technical staff, and sharing best practice. Engage with more laboratories to encourage and enable	Exit process document is now complete. Lab sustainability sessions formed part of the inductions for labs users in September – these were provided either by the existing labs teams (e.g. Roslin) or by the SRS department (e.g. IGMM and Chemistry). The support for HEaTED took the form of a Labs Workshop session on sustainability CPD for technical staff in early November. In addition the Programmes Coordinator – Laboratories has attended 2 HEaTED regional conferences and assisted in the production of a conference poster on the connection between sustainability and lab technical staff. Additional laboratories have been engaged within the Geosciences department at King's Buildings and further requests for assistance have been received from SRUC

Objective	Progress (RAG)	Tasks	Comments (August 2015)
		sustainability actions and participation in Sustainability Awards. (Where ESA is not suitable for the lab, opportunities for improvement should still be identified and enabled). Publish case studies on website and distribute to key stakeholders Develop and distribute resources/materials promoting best practice in laboratories.	labs (one of whom participated in the Lab Awards). Contact has been made with SCRM and representatives of labs in Physics and Engineering and these shall be followed up to increase engagement. The representatives from SCRM and Engineering attended the Labs Workshop on utilities in August. Case studies have been completed, circulated for review among attendees of the SLSG workshops and published on the SRS website. An updated version of the labs sustainability poster has been produced and circulated. A new design of switch-off stickers has been printed. Further fume cupboard stickers have been printed and circulated. A new approach of 'tips cards' (credit card sized items with tips for sustainability) is currently being developed by the SRS comms team.
Identify and enable utilities efficiency improvement projects throughout the university		Identify the air handling system settings for rooms containing -80°C freezers and assess for suitability (size of "dead band" and set point temperatures) Identify funding to support replacing mercury lamps in microscopes with LED lamps.	Universal temperatures aren't easily identified as there is a trade-off between equipment heat gains and air con usage, but generic communications materials are being developed which urge users not to cool freezer spaces with air con below 20^{o}C. The sustainable labs evidence base, along with investigations undertaken by the central imaging team at IGMM, has been used to develop a business case for replacing up to 15 units within IGMM. The College Registrar for Medicine and Veterinary Medicine was approached by the Zone Manager for MVM and has committed to match-funding for this project based on initial estimates of total project costs of c.£30k.

Objective	Progress (RAG)	Tasks	Comments (August 2015)
		Identify areas for motion sensor/daylight sensor controls for lighting.	Some areas were identified during Lab Awards audits. More thorough energy audits will be conducted by the SRS team as part of the CSG target of reducing energy costs by 10% by 2018.
		Identify funding to support replacing older -80°C freezers with new models.	Funding for items of equipment such as this can be accessed via the Labs Small Equipment Fund currently, with a view to potentially creating a Sustainable Campus Fund which could be used to support more actions which improve sustainability.
		Identify opportunities to divert non-hazardous laboratory consumables from landfill (e.g. gloves, plastics)	Glove recycling and diversion of non-hazardous lab plastics was discussed during the Lab Awards audits and also at the first Labs Workshop. Further opportunities to reduce lab waste will be identified and acted upon during meetings with successful tenderers for the Life Science Tender, who were asked to commit to sustainability improvements. 2 meetings have been held with Sigma-Aldrich, and 1 with VWR.
		Identify opportunities to raise the temperatures of back-up -80 freezers.	Opportunities were discussed during engagement with labs as part of the Lab Awards audits, and also in subsequent engagement during the SLSG workshops where best practices are discussed. Consequently those attending SLSG workshops have been asked to check for opportunities to raise temperatures of back-up freezers.
		Identify opportunities to change fluorescent area lighting to LED lighting.	Some areas were identified during Lab Awards audits. More thorough energy audits will be conducted by the SRS team as part of the CSG target of reducing energy costs by 10% by 2018.
		Identify opportunities to establish packaging take-back schemes.	This was discussed at the first Labs Workshop. Further opportunities to reduce lab waste will be identified and acted upon during meetings with successful tenderers for the Life Science Tender, who were asked to commit to sustainability improvements. 2 meetings have been held with Sigma-Aldrich, and 1 with VWR.
		Engage with academic colleges and corporate services to discuss	The SRS department has committed £5k to the Labs Small Equipment Fund. A review of the funding opportunities for lab sustainability is being undertaken between SRS

Objective	Progress (RAG)	Tasks	Comments (August 2015)
		improving accessibility to existing funding streams.	and Estates, with one proposed solution being a Campus Sustainability Fund. The college of MVM has committed to match-funding support for LED microscopes at IGMM. The Roslin Institute has committed to funding the cost of assays for the forthcoming freezer trials.
To secure funding to support the continuation of sustainable laboratory work within the University of Edinburgh		Engage with SFC to secure funding for further sustainable laboratories positions/resources. Engage with Universities Scotland Efficiencies Taskforce Engage with other institutions	SFC are not currently looking like a likely source of funding for this work in 2016. However, Zero Waste Scotland may be in a position to fund this role, potentially with more of a focus on waste. An application has been made to ZWS for a labs based project focussing on improving the circular economy aspects of labs. This has raised interest with ZWS and the Scottish Government and discussions are on-going. Independently of this the UoE Post Review Group have approved an extension to the contract of Programmes Coordinator – Laboratories until end of July 2016. No further engagement has been made with USET. In August Dave Gorman met with Martin Kirkwood of SFC and mentioned that Sir Ian Diamond would be speaking at the EAUC conference and this could be an opportunity to gauge/build on sector-wide support for labs sustainability. Martin Kirkwood was going to meet with Sir Ian Diamond subsequently. Connections have been made with labs sustainability staff at other universities via S-Labs workshops and also through independent proactive engagement with St Andrews, Strathclyde, King's College London and Bristol including mutual visits to with St Andrews, and hosting representatives from Strathclyde and Bristol as well as regular engagement with Martin Farley who is now at King's College London.
To ensure sustainability concerns are embedded within the processes of estates design		Review and develop design and construction guidelines for new laboratories.	Design guidelines are being produced by S-Labs as a result of a meeting attended by AA. The SLSG workshop on lab design was asked to review the draft guidelines and the feedback has been provided to S-Lab. An updated version was published by S-Lab in late October and circulated to labs and Estates Development contacts in early November 2015.

Objective	Progress (RAG)	Tasks	Comments (August 2015)
and construction		Establish a mechanism by which SLSG/SRS can be informed of and influence new estates developments for laboratories.	SRS have provided consultation responses both in written form and by attending meetings on the design of the Darwin Tower development (led by Andrew Arnott). In addition, the SRS department has supported the running of an 'R & Dialogue' format consultation session on the design of the Darwin Tower development. Andrew has also been consulted on the design of the new Bioquarter and the Institute for Regeneration and Repair and will be involved in future meetings. Following discussions with Angie Ingram (IGMM), AA will be invited to meetings relating to refurbishment and redevelopment of laboratories in the Western General area.

THE UNIVERSITY of EDINBURGH

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Sustainable Labs Steering Group

17th November 2015

Labs Energy Saving Programmes Proposals

Description of paper
This paper summarises 3 programmes which have been developed in order to achieve energy savings within labs. The programmes consist of individual projects which almost all require investment in either buildings or equipment.

Action requested
SLSG are asked to note the 3 programmes and provide guidance on preferred choice.

Recommendation
It is recommended that the 'Low' or 'original' programme provides best value for money, but that the Medium and High programmes provide greater cost and carbon savings, and thus provide further contribution to the aim of a 10% reduction in utility costs.

Background and context
SRS and Estates have been given the task of identifying and implementing actions to reduce the university's utility spend by 10% versus 'Business As Usual' by 2017.

Through compiling the evidence base on opportunities for sustainability improvements in laboratories, an original programme was developed which was circulated to the SLSG already in the meeting in June 2015 under the title of "Sustainable Labs Evidence Base". This has since been reviewed and expanded upon.

Discussion
Three programmes of work have been outlined, and are summarised below. All contain roughly the same actions, but the intensity of the actions varies (i.e. the number of buildings or items of equipment to which the action pertains; or the timeframe).

The programmes:

	Low ("Original")					Medium ("2 year")					High ("Maximum")				
	Number of units (buildings/items of equipment)					Number of units (buildings/items of equipment)					Number of units (buildings/items of equipment)				
Year	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Action															
Replace old ULT freezers with new	10	10	10	10	10	15	10	0	0	0	200	50	50	10	10
Rationalisation of sample storage to enable some ULT freezers to be emptied and switched off	1	2	5	5	5	2	2	0	0	0	10	10	20	2	2
Replace CV fume cupboards with VAV	46	10	10	10	10	46	10	0	0	0	46	50	50	2	2
Replace standard fume cupboards with low flow	10	15	15	15	15	40	15	0	0	0	10	15	20	2	2
Replace fluorescent lighting with LED	100	200	200	200	200	100	200	0	0	0	1000	1000	1000	500	500
Install motion sensor controls on lighting	25	50	50	50	50	100	50	0	0	0	1000	1000	1000	500	500
Fit timer plugs to equipment	45	45	100	100	100	30	45	0	0	0	150	60	30	15	15
Replace inefficient drying ovens with modern, efficient ones	5	5	10	10	10	10	5	0	0	0	75	25	10	5	5

Install Demand Based Ventilation (retrofit and/or new build)	0	1	0	0	1	0	1	0	0	0	0	2	0	0	2
Incorporate natural ventilation into design of new freezer rooms/"freezer farms"	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Raise temperature of ULT freezers to minus 70ºC (once evidence available from Roslin freezer project)	0	0	0	0	250	0	0	0	0	0	0	0	0	0	250

Resource implications

Name of programme	Timescale	Total spend required (estimated) (£)	Total annual financial savings (estimated) (£)	Total CO2e savings (tonnes)	Combined payback period (years)	Cost per CO2e saving (£/tonne)	Comments
Low or "Original" programme	5 years	£1,073,526	£556,090	3,018	1.9	£356	More or less as presented at the SLSG meeting in June (taking into account some comments and corrections)
Medium or "2 year labs programme"	2 years	£690,999	£205,259	1,216	3.4	£568	Compressed programme of actions with the aim of achieving a £200k annual saving total within 2 years
High or "Maximum labs programme"	5 years	£5,036,912	£1,065,908	5,881	4.7	£856	This is a 'best case scenario' ambitious programme where all projects are fully funded and actioned with high priority, everything goes to plan, project management support from colleagues across the uni, and a substantially larger budget.

Risk Management

Savings and costs calculations have been done at a necessarily high level, and as such the actual figures may vary. Inflation of energy costs (and therefore energy savings) has been assumed at 3% and project implementation costs at 2%. There is no overall equipment inventory for all laboratories across the University of Edinburgh, and as such the maximum number of items of equipment which may be involved in any particular action is not known.

THE UNIVERSITY of EDINBURGH

Sustainable Labs Steering Group

17th November 2015

Action Log – Labs Workshops June, August and November 2015

Description of paper
This paper summarises the actions noted from the Labs Workshops in June, August and November 2015.

Action requested
For noting.

Recommendation
Note the actions which have been identified through these workshops.

Background and context
Four Labs Workshops were scheduled for 2015 after discussions at the inaugural meeting of the Sustainable Labs Steering Group in January 2015. The SLSG core group were made aware of the outcomes of the first workshop (waste and procurement) during their meeting in June 2015. This paper seeks to provide a summary of the actions arising from the subsequent 3 workshops.

Discussion
Labs Workshop on Design Guidelines held in the Cuillin Room at Charles Stewart House on Tuesday 16 June 2015:

Action	Status
Action – JR to recirculate the Good Laboratory Design document.	Complete. A new version of the document was produced in late October 2015 and circulated in early November.
Action – All to use track changes to record their comments [on the Labs Design Guidelines] and return to AA.	Comments received from Candice Schmidt in H&S.
Action – AA to touch base with Graham Thomas on BRF.	This action has not yet been progressed.
Action – JR to circulate AA's current working document [Sustainable Labs Evidence Base] for comment.	Complete
Action – All to share their thoughts with AA on bench space per lab user; dropping fume cupboard rates from 0.5 to 0.3; impact on science, health and safety or any other concerns.	Response received on ventilation from H&S.
Action – All to suggest a research student representative to join SLSG.	Research student suggested from Chemistry – attended next meeting in August.

Labs Workshop on Utilities held in the Meeting Room 1.07 at the Main Library on Thursday 20th August 2015:

Action	**Status**
Action – All to email AA with any examples that had not already been captured [within the Sustainable Labs Evidence Base].	No examples sent to date. Assume Sustainable Labs Evidence Base is complete.
Action – AA to collate and share feedback [given in the group working session on utility cost reduction], integrating it into the labs evidence base document and the implementation plan.	Feedback was collated and will inform the next implementation plan. Circulated recently.
Action – All attendees wishing to receive more detail on any of the options to contact GM.	Unknown if anyone contacted GM for further details.
Action – All attendees to share any feedback with AA on how these workshops could be improved.	No feedback received yet (Nov 2015)
Action – All attendees who had not yet received their delivery of lab posters to follow up with AA.	No requests received