Improving Laboratory Performance through the S-Lab Environmental Assessment Framework - An Implementation Guide

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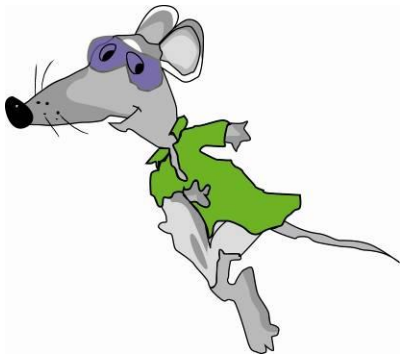
The Framework has been developed by the S-Lab (Safe, Successful and Sustainable Laboratories) initiative, in collaboration with the NUS Green Impact Scheme. It is based on an original idea by the LabRATS (Laboratory Research and Technical Staff) programme at the University of California, Santa Barbara.

S-Lab: www.goodcampus.org

Green Impact: www.nus.org.uk/greenimpact

LabRATS: http://sustainability.ucsb.edu/LARS



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NUS Green Impact Scheme

S-Lab is delighted that its laboratory environmental assessment framework has been incorporated into the Green Impact scheme of the National Union of Students (NUS). The scheme assesses and improves the environmental performance of teams and departments in many students' unions, universities, and colleges, and is also being adopted in other areas such as hospitals. Institutions license a package from NUS that includes use of a standard assessment methodology (which has a number of criteria in an online workbook), and support, including auditor training.

The scheme is usually co-ordinated internally by an Environmental Manager, often with support from an intern or assistant as well as external support from NUS, but one advantage of using Green Impact is that it need not take up too much of their time as a combination of eager students and NUS support can do much of the work.

NUS has a recommended approach to implementing Green Impact but organisations can adapt many aspects if they wish. The standard approach is that credits are rated as Bronze, Silver, Gold or Bonus. Users then work in teams to self-assess whether they meet them. The results are entered into the workbook and audited by specially recruited and trained students. They then assign a rating of Gold, Silver, Bronze or Working towards Improvement.

Bronze is typically achieved by meeting all Bronze level criteria, Silver by meeting all Bronze and Silver level criteria, and Gold by meeting all Bronze and Silver criteria plus a proportion (determined locally) of Bonus or Gold credits. The cycle culminates in an annual awards ceremony which recognises and celebrates the achievements of those involved.

The S-Lab criteria comprise a worksheet - known as the 'Lab Tab' - within the Green Impact workbook. In the first two years of operation (2011-13) the lab tab was used in several hundred different laboratories in UK universities. As noted below, some universities have modified the NUS recommended approach for this area, in particular by trying different scoring methods or by using postgrads, postdocs or interns to undertake assessments and / or auditing. See www.nus.org.uk/greenimpact or contact giu@nus.org.uk.

Introduction

Laboratory operation has many significant environmental impacts ranging from energy and resource consumption to chemical and equipment use and disposal. Experience shows that many of these impacts could be reduced or avoided in cost-effective ways without compromising research, safety or teaching - indeed, they can often be enhanced.
See the S-Lab section of www.goodcampus.org for many examples of this.

S-Labs have produced three related documents to support analysis of environmental impacts in laboratories, and to identify and implement improvement opportunities:

- A laboratory environmental assessment framework (abbreviated to 'the framework').
- A best practice guide which provides a summary of resources and examples of best practice relating to each criteria.
- An implementation guide (this document) which provides examples and guidance of how to implement the framework in practice.

The 2013-14 framework comprises 57 criteria grouped into 11 issue categories:

- 1. Chemicals and Materials (CM)
- 2. Cold Storage, i.e. fridges, freezers, nitrogen devices (CS)
- 3. Fume Cupboards and Containment (FC)
- 4. Lighting (L)
- 5. Management and Training (MT)
- 6. Scientific Equipment (including personal computing and printing) (SE)
- 7. Waste and Recycling (WR)
- 8. Water (W)
- 9. Building and Services (BS)
- 10. Organisational Management and Policies (ORG)
- 11. Innovation and Dissemination (IND).

The framework can be used to assess the environmental performance of all levels of a laboratory – individual rooms or suites, floors, buildings and departmental / school management and policy – by determining which of the criteria relevant to its operation have been met.[1] Outcomes can then be graded and compared, in several different ways as described in section 6.

This is the fourth year of operation and so the criteria – which were evidence based to begin with, and have been tested in hundreds of laboratories – have been refined with experience. They therefore provide good coverage of all the main laboratory-related environmental issues, as well as highlighting areas where good environmental practice can also produce other benefits, such as financial savings or strengthening health and safety.

The framework can be used by anyone – subject to the conditions of use that results are returned to S-Lab – but in the UK there is the option of undertaking this as part of the NUS Green Impact Scheme (see box above). S-Lab recommends use of this scheme for eligible organisations if they wish to have more proactive support for the implementation of the S-Lab assessment criteria, and to gain independent accreditation and recognition of their assessments.

The following sections discuss seven key elements in implementing the framework (Aims, Scope, Management and Support, Assessment, Auditing, Rating and Follow Up); and using it over time to drive improvement. It ends with five case studies of how it has been implemented in practice at Queen's University Belfast, the University of Edinburgh, the University of Leeds, the University of Manchester and Genentech.

[1] As there are many different kinds of laboratories, any assessment starts with working out which criteria are relevant.

1. Aims

There are many different reasons for undertaking an assessment, including:

- Raising awareness of what environmental issues are relevant to labs and what can be done to mitigate them.
- Identifying opportunities for improvement to both minimise environmental improvement, and save money.
- Checking compliance with environment and related regulations and schemes, and stimulating action when this is not in place.
- Enabling benchmarking with other laboratories, either internally or beyond.
- Providing broader recognition for good practice and innovation within individual labs.
- Creating a better understanding of the building and its operations (with non-energy benefits such as identification of broken or malfunctioning equipment).
- Giving assurance that regulations and policies are complied with.
- Creating and strengthening personal and organisational relationships, e.g. between technical staff in different areas and/or between lab users, Estates and other stakeholders.

The relative importance of these aims will obviously determine the approach in practice.

2. Scope of a Laboratory Environmental Assessment

There are three main decisions to be made about scope:

- What level will the exercise take place at?
- How many assessments will be done?
- Who will be involved?

As the cases indicate, the framework has been applied variously at whole building, departmental / school, floor, room suite, and individual room level. The latter levels can be the most straightforward, as they are not concerned with the Buildings and Services and Organisational Management and Policy categories.

Hence, they can focus on topics which are readily understandable and where short-medium term improvement opportunities abound, and can often be implemented through individual action. Assessments at this level can be done by a single laboratory technician, although it is always encouraged to get inputs from users such as academics, postdocs, demonstrators and students.

Building and departmental/school (which are often synonymous) level assessments make use of categories 9 and 10 within the framework and involve a wider range of people. At a minimum this is likely to be technical staff from several laboratories and the person(s) responsible for building and facilities management, but it will be most effective if it also has involvement by Estates / Facilities departments (where these exist) and the scientists who work in them.

Building/organisational unit assessments have the advantage of addressing important issues that are beyond the influence of individual laboratory rooms or suites, such as Estates. However, they can have difficulty in determining whether criteria are met or not if they contain a range of individual laboratories.

The ideal approach to cover all aspects of laboratory performance, and to drive improvement, would be to have two separate but linked assessment exercises, with the results of room / suite assessments feeding into a separate building and school/departmental assessment.

3. Management and Support

There are three key questions:

- Who will have overall 'ownership' of the exercise?
- Who will manage day to day activities?
- How will assessments, audits and any related actions be resourced?

The original Green Impact model is a 'light touch' one which covers all aspects of university activity and answers the questions in this way:

- The exercise is owned by an Environmental or Sustainability Manager. Sometimes this person will employ an intern or student volunteers to help them to recruit users and auditors, provide information and training, and manage any organisational issues.
- Staff within laboratories form teams to work on the criteria throughout the academic year, self assessing their progress.
- Trained staff and students undertake audits at the end of the project cycle and to a greater or less degree provide assistance (sometimes alongside an intern) either on a volunteer basis or for a small payment.

However, many framework users have adapted this model for laboratories, generally as part of Green Impact but sometimes independently. The reasons for this include the value of auditors having laboratory knowledge, the need for them to have credibility with laboratory users, and the desire to raise those users' awareness of possible improvement actions (which are often different to those in more mainstream locations). The adaptations include:

- Managing the exercise through a specialist resource (as at the University of Edinburgh, where an existing team of staff who support Green Impact have been supplemented by a specialist laboratory intern).
- Using a specialist to undertake assessments (as at Genentech).
- Using postgrad students and/or postdocs as the main auditors (as at Queen's University Belfast).
- Using laboratory staff to cross-audit, either as the main resource (as at the Universities of Edinburgh and Manchester) or in combination with others (as at Queen's).

4. Assessment Approach

There are two broad approaches to this:

1. Self-assessment by participants
2. Assessment by an outside person.

Self-assessment has the advantage of being speedy, as assessor(s) obviously know lab conditions, and so not taking too much time. It can therefore be a useful way in for first time users. However, answers can be overly positive without any check on veracity, it can be difficult to understand what some of the credits are 'getting at', and there is little drive for improvement if nothing happens about the answers.

Green Impact uses self-assessment by laboratory staff but avoids some of the problems by having answers verified by auditors (see below). However, some framework users have involved external people in the assessment by:

- Having assessments done jointly by someone from the lab, and another person(s) such as a laboratory specialist (as at University of Edinburgh) or a technician from another laboratory
- Having assessments done completely by an outside person.

In most cases the results are still audited, but in some not as it is felt that the external element within assessment removed the need for it.

External involvement of this type generally takes more time, as there is a need for the outside assessors to pick up relevant information. However, it can have the advantage of bringing in different perspectives to the lab, and of encouraging sharing of experiences between technicians when this route is chosen. This is especially true if there is a core group of assessors who demonstrate good practice in their own laboratories. An external element can also help achieve consistency between assessments.

One important decision is whether participating laboratories are assessed according to their current state, or allowed a grace period after an initial check to make improvements before preparing a final assessment. The first method is quick and simple, and provides useful evidence about the current state of laboratory performance. The latter is more of a spur to improvement but does increase time demands.

All Green Impact audits build in an element of flexibility and an opportunity for teams to amend or complete further criteria after the final assessment. Some institutions are also implementing mid-point audits to enable longer term or larger changes to be made before the final audit.

Most users of the framework have adopted a simple achieved/not achieved approach for each credit. However, a few that are not using Green Impact have had an intermediate 'semi-achieved' category that counts for a half point in points based scoring schemes (see section 6).

5. Auditing Approach

The basic Green Impact model involves student auditors checking that self-assessments and resulting scores are accurate. In some organisations, all self-assessments are audited, in others just a sample. The model has generally been most successful in labs when students have been accompanied by staff and have had a science background, which means that they are familiar with lab settings and also gives them credibility with those being audited.

Other approaches to auditing have been:

- Having it done by a postgrad or a laboratory specialist.
- Using 'peer auditing' in which the audit is done by a technician from another laboratory.
- Group audits involving several people, typically other technicians.

As the case indicates, the University of Edinburgh had elements of all these, with a group of technicians auditing other laboratory buildings, with the additional involvement of a laboratory specialist.

Peer auditing can be very valuable because it provides the 'edge' of specialist external scrutiny and also a quick mechanism to disseminate good practice. However, there is a danger of it being too cosy, with people reluctant to challenge their colleagues.

Having a laboratory specialist present for all audits does require additional resource but can strengthen comparability between audits (thereby reduce the possibility of 'grade inflation' so that all laboratories end up achieving the highest possible level) and also provide more improvement ideas than might be achieved through other methods.

The sophisticated nature of modern research facilities means that an individual versed in scientific methodologies and processes can also aid the quality of assessment in specialist areas, and strengthen credibility with laboratory users.

Audit (and assessment) can be done at two levels. A 'broad brush' version would involve only modest follow up to deal with any remaining queries and to review and finalise a simple summary of answers and recommendations. The existence of supporting information for the evaluation criteria would be assumed on the basis of verbal assurances rather than physically checked.

A more thorough version would involve checking of evidence, more probing of some key issues and more systematic consideration of improvement actions. It is the latter that would be required if taking part in the Green Impact programme. In some cases, measurement, e.g. of lighting, power consumption and/or temperature, may also be appropriate, either during the initial assessment or, more likely, as a follow up activity.

6. Rating

Several methods of rating framework assessments have been used, including:

- Total points score
- Achievement of Gold/Silver/Bronze status.

A simple percentage of points obtained compared to the total available can enable comparisons between laboratories. The simplest method of doing this is to give 1 point for each criteria that is achieved and 0 if not achieved. However, it is also possible (outside Green Impact) to give 0.5 points if a criteria is semi-achieved, or if laboratories are working towards achievement.

A simple approach of this kind treats each criteria as equally important although, of course, this is not the case in practice. An alternative approach would be to weight the categories so that some are given 2 or more points. However, it is difficult in practice to get consensus on weightings so S-lab is not aware of any organisations that have adopted this approach.

Green Impact recommends a Gold, Silver and Bronze classification in order to have a clear message about levels of achievement, and to spur improvement. There are three options for this:

- Classifying criteria - as Bronze, Silver, Gold or Bonus ones - based primarily on their ease of achievement.
- Percentages - basing the ranking on the percentage point score (with the Gold level either being set as an absolute number, or at the level reached by the best performing laboratory).
- Hybrid – setting a minimum parentage points threshold for each classification, either from the sub-set of criteria for each from all credits.

Green Impact does not have a standard approach to this, but it helps users by classifying criteria as Bronze, Silver, Gold and Bonus (which are those in the Building and Services and Organisational Management and Policies sections that can only be addressed if the assessment is being conducted at those levels).

Most users have decided that all relevant criteria must be met for each level, i.e. all Bronze credits to get Bronze, all Bronze and Silver to get Silver and all Bronze, and Silver plus some or all of Gold and Bonus points to get Gold. Green Impact also suggests a fourth category of Working Towards to give some recognition to teams that don't complete enough criteria to gain a Bronze.

7. Follow Up

The main follow up for many Green Impact users of the framework has been a short summary report of credits gained, the student audit to verify their results, recognition of achievement in an overall Green Impact Awards ceremony and a feedback report for each team and institution at the end of the year to frame their success as a team in the context of the organisation as a whole.

The broader recognition which the awards ceremony creates is an important element in the success of Green Impact. Some organisations have gone beyond this through some or all of the following:

- Short feedback reports to assessed laboratories with improvement suggestions.
- A report summarising and analysing all results with recommendations on future actions.
- Discussion of a report or other outcomes at a business meeting, e.g. departmental or school meetings, sustainability action groups.

8. Using the Framework to Drive Improvement

A number of organisations are now in their third year of undertaking laboratory assessments, and finding that benefits are increasing with time as they become experienced, and as a body of committed and knowledgeable assessors and auditors develop. Often, the benefits are only partly environmental and arise because assessment has led to discussion and action about more general. However, new challenges also arise such as maintaining interest in laboratories that have achieved Gold for one or more years. Some lessons from user experience are:

- **Keep it fresh** – S-Lab's annual review process seeks to constantly raise standards, especially in areas where many people are achieving Gold, so as to maintain an element of challenge. This can also be done at institutional level. ther local measures include identifying focus topics that will be assessed and audited in greater depth, e.g. cold storage, addressing building/school level issues if the previous focus has been on room/suite assessments (and vice versa) and developing additional criteria.
- **Take ownership** – Green Impact in laboratories generally involves a greater level of involvement by staff than other areas, and in some cases it has been substantially organised in practice by a technical manager (as at Queen's) or laboratory sustainability group (as at Manchester). The more that it is integrated with, and supports other laboratory improvement actions and concerns the more successful it is likely to be. This is only likely to be successful if laboratory staff are in the driving seat for lab-focused assessments. (Of course, administrative and other support from an Environmental / Sustainability manager and NUS remain important in universities that have Green Impact).
- **Operate strategically** – The more that assessment activities support the objectives of key stakeholders such as academics and research managers, the more successful they are likely to be. The optimum way of achieving this is to have senior manager backing and 'hands on' involvement in the exercise (as at Manchester and Queen's). In an ideal world, this would include a PVC level manager chairing a laboratory improvement/sustainability working group which would create cross-functional collaboration, co-ordinate action and provide a vehicle for continuous improvement through reflecting on and responding to the outputs of previous assessments. It may also involve establishing connections with other laboratory activities, e.g. joint environmental, health and safety auditing.
- **Create an improvement cycle** - Assessments often identify a number of options for improvement but achieving this can require a follow through. One option is to create a requirement for a Gold award – or perhaps a new higher level Award (Platinum?) - that an improvement plan was created as a result of an assessment 12 months ago, and that actions have been taken to achieve it. A variant would be to create a Platinum or similar Award for the overall best laboratory, based either on an overall submission or performance against targets set the previous year. Another option is to record criteria which labs are achieving on a 'benefit of the doubt' basis and require clear proof in the following year that the laboratory is fully compliant with the criteria.

9. Case Study – Queen's University Belfast

The programme assessed 6 laboratories (room / suite level) in 2011-12 and 23 in 2012-13. 16 of the latter were in Chemistry and Chemical Engineering, where all technical staff have been strongly encouraged to take part.

Scope – The assessments have all been done at room / suite level. However, Chemistry and Chemical Engineering has monthly GI meetings which each team has been expected to send at least one person. This has meant that several building / school level issues have been addressed.

Management and Support – The process was organised in 2012-3 by Estates through Sara Lynch, Sustainability Manager, and an environmental intern, Jill Mulholland. It has strong backing from senior management.

In Chemistry and Chemical Engineering, for example, GI and environmental matters are a standing item on the School Management Board agenda and the Head of School sends all those participating an email backing the process and attends many of the GI meetings. Trevor Sewell, the Technical Manager in the School who has led GI activities, believes that "this clear backing from a senior manager has made a huge difference to participation levels and achievements."

Assessment –These are completed by mixed teams of 1 technical staff member, 2 PhDs, and 2 post docs.

Auditing – This was done by teams from one of the laboratories participating. Estates ran a two hour auditor training beforehand, with inputs from Trevor Sewell.

Rating – Queens has introduced a School level Platinum award. This is given to the School that has achieved Gold status laboratories and which is felt to have had the best environmental performance over the year. It was judged through a 4-5 page submission on what the lab had done to achieve environmental improvement, and to communicate results to other laboratories. It is judged by a group of estates and environmental managers.

The 2013 Award winner was the School of Chemistry and Chemical Engineering, in part because of an environmental awareness day which it organised in conjunction with Green Impact and which was attended by many people from outside the School.

It involved lectures and a quiz, exhibitions by suppliers, and practical activities such as tree planting. The latter provided a striking example of 'closing the loop' as one research topic within the School is extracting chemicals from bark so that the trees can be used as raw material in several decades time.

Follow Up – There is a large awards ceremony attended by the Registrar. There is also a monthly GI newsletter and Trevor Sewell is establishing a laboratory related GI blog. Outcomes have been further discussed in departmental and school meetings.

10. Case Study - The University of Edinburgh

The University uses Green Impact which is badged as 'Edinburgh Sustainability Awards' (ESA). These involve more than assessment and auditing as they provide advice and support from a small team managed by Matthew Lawson in the Social Responsibility and Sustainability (SRS) department.

Scope – The University has well developed building and floor manager roles which are a natural focus for many laboratory activities, and which often result in a higher degree of building / school co-ordination and central services than in many other institutions. Hence, all assessments conducted to date have been at building level. Matthew Lawson believes that "it has been very helpful to tackle larger scale issues such as PIR lighting for an entire building or induction processes for all new members of staff."

Management and Support – The SRS staff manage the scheme which has gained support from senior managers, especially the Registrar of the College of Medicine and Veterinary Medicine. In 2012-13 a joint University / Scottish Funding Council / S-Lab project employed a science-educated intern, Martin Farley, as a laboratory environmental specialist to support the building self-assessments and to be present for all audits. This ensured consistency between assessment interpretation, grading and auditing. Furthermore, it provided an on site resource to answer various questions raised by the assessments, and helped to identify improvement opportunities particular to the university.

Assessment – These were done collectively by groups of 3-9 participants (generally a mix of building / floor managers and technical staff) who met at regular intervals. They were asked to meet the relevant laboratory criteria, and also additional non-laboratory specific ones such as promoting well-being, equality and diversity that were taken from the general Green Impact scheme or University policies. Groups were given several months to meet the criteria and so they began by deciding what they already met, and what they could realistically put in place within this period. Martin Farley was available to help them during this process, and participated in some meetings. Towards the end of the period, they completed the assessment and compiled supporting evidence and submitted it to the ESA.

Auditing – This was done by a group of 2-3 people, who were peer technical staff or building managers from other buildings, plus Martin Farley. Each audit involved a full building walk around, followed by discussion as to whether credits were awarded or not. This allowed not only for conferring on which credits were achieved, but also allowed building staff to share techniques or practices that were otherwise isolated to buildings or schools. Matt Lawson feels that "this collective approach meant that the audit judgements weren't those of a single individual but were based on a wider knowledge and experience. It also gave a spur to improvement because people knew that their performance would be scrutinised by peers."

Rating – This followed the Green Impact recommended approach of Bronze Awards being based on achieving all Bronze rated credits, Silver of all Bronze and Silver credits, and Gold as a minimum percentage of points from the Bonus categories. In the general scheme seven teams were awarded with Bronze, three Silver and eight Gold Awards in the third year of the scheme.

2012-13 was the second year the Labs Tab was offered and labs in the New Medical School at Chancellor's Building won Gold; the recently-merged Roslin Institute (once home of 'Dolly the Sheep') were awarded Silver; and Biomedical Sciences and Chemistry Bronze. Having the specialist intern oversee all ratings allowed for more parity between old and new buildings.

Follow Up – Next year Edinburgh hopes to increase the number of buildings and schools involved. Furthermore, several projects have arisen from using the assessment, such as looking at how the university manages cold storage. This will include a long-term study in partnership with VWR to look at long-term storage of samples at varying temperatures in an attempt to ensure that sample viability is not jeopardized by increasing ULT temperatures. It is also likely that a permanent laboratory support role will be established within the SRS.

Benefits – Martin Farley believes that "the process had many benefits. It highlighted the scope for improvement, both in day to day housekeeping and more strategic areas. One immediate result was a study of the energy consumption of Roslin Institute ULT freezers at varying temperatures, undertaken by specialist intern and building staff. This demonstrated the importance of ambient conditions – and therefore the value of putting freezers into as cool areas as possible – and also the importance of regular maintenance. Assessment also created better connections and sharing of experience and knowledge within buildings, and between them. This sometimes including surprising variations between Schools, for example, some allowed PIs their own freezers but another had central management and allocation of freezer space."

11. Case Study – The University of Leeds

The University undertook lab assessment as an expansion of the already successful Green Impact programme on campus. This has involved around 40 teams making assessments at office and school level. In total, 10 laboratories were engaged in 2012-13, 3 of which were awarded a Gold standard.

Scope – The assessments were based on laboratory groups, a decision made to give lab users autonomy within the project and to create a sense of ownership.

Management and Support – The laboratory programme was managed by Sam McCarthy, an intern within the University Sustainability Team, Workshops were run for all labs involved, in conjunction with NUS, to create a social and peer support network. Drop in discussions, and consultations, occurred alongside the workshop. In the School of Earth and Environment 5 labs took part, which Sam said was "a real benefit to them, and myself, allowing me to create a dynamic large team within the school whilst working closely with Jane-Marie Sticks, the schools laboratory manager."

Assessment – This was done by teams containing a mix of academics and technical staff. In the Plant Nematology Laboratory, for example, the team lead Jennie Hibbard, ensured that it was raised at a weekly lab meeting, and everyone was given specific tasks.

Auditing – This was undertaken by the normal Green Impact method of student auditors, however it was ensured that science, or lab familiar students took a lead with the assessment.

Rating – The recommended Green Impact approach of Bronze Awards being based on completing all Bronze criterion. Silver, all Bronze and Silver criterion, and Gold as gaining a total number of points from the Bonus categories, with Awards presented by the Vice-Chancellor, Michael Arthur, at a university-wide ceremony.

Follow Up – There was no formal follow up, but ideas that emerged from the audit were shared at school and faculty level. One action was attaching energy monitors to freezers to demonstrate that raising freezer temperatures from -80^0 to -70^0C reduced energy consumption by 10-17%.

Another was requiring supervisors to sign to confirm that outgoing students have cleared materials from them. In the School of Biology Faculty newsletter there is now a regular feature called 'Three Green Ideas' section, one for the office, one for the lab, and one for life.

Benefits – Jennifer Hibbard, a Research Technician in the Plant Nematology Laboratory believes that "the criteria fitted with our laboratory culture of good housekeeping and attention to detail, and were timely in helping us to make the most of our newly refurbished laboratory space. I was especially pleased with the links to health and safety, where we amended our annual update of COSHH forms to explore opportunities to reduce chemical use or find safer alternatives."

12. Case Study – The University of Manchester

The University has ambitious environmental goals, including carbon emissions in 2020 that are 40% lower than in 2007/8. A sustainable laboratories group meets quarterly to help achieve the goals in STEM areas. It comprises Technical Services Managers from each of the 3 science and technology faculties, senior academic staff holding sustainability portfolios, Estates and H&S professionals. One core activity has been using the framework in each faculty, with eight assessments having been being undertaken in 2011-12 increasing to 13 assessments in 2012 - 13.

Scope – There is a university-wide Green Impact scheme, run out of the University Environmental Sustainability office, the office also oversee management of assessments and audits in laboratories working with the sustainable laboratories group. Assessments are primarily undertaken at room or suite level, there having been just one example of Building level assessment to date. A strong cross-functional element has been cultivated as building bridges between lab occupants, Estates and H&S professionals is an important part of the exercise.

Establishment, progress and development of the assessments has been co-ordinated by the Chair of the Laboratory Sustainability Group, Dr. Arthur Nicholas. He is currently an Estates-based Building Officer for two Faculties, Life Sciences and Medical & Human Sciences but was previously a researcher in the faculty of Life Sciences.

Assessment – The assessments are lead by groups of technical staff, sharing of information, best practice and expertise between groups is a fundamental concept of the exercise.

Auditing – This is undertaken by student Green Impact auditors and members of the sustainable laboratories group.

Rating – The participating groups are currently rated in the standard Green Impact manner, and are recognised in an annual Awards ceremony. Though going forward, Arthur believes this may achieve a greater impact by evolving into a “star rating” system focusing the award on the laboratory itself as a “quality indicator” rather than the group undertaking the assessment.

Follow Up – There is no formal follow up, but development of the scheme, outcomes and points arising are discussed in the laboratory group and some staff involved in the assessments have subsequently introduced changes into their own laboratories.

For example, David Carthy, Laboratory Manager at The Centre for Integrated Genomic Medical Research (CIGMR), found it “really useful to look at other labs in detail and share experiences with other managers. I had been wondering if we could get motion-controlled lighting so when I saw it working in Geochemistry I suggested it in our next internal lab meeting – which often discusses environmental issues - and it’s now being piloted.”

Benefits – Arthur Nicholas comments that: “When I was working in labs I saw many opportunities for environmental improvements but without a body of knowledge it was difficult to make progress. The assessment criteria provide a systematic way for lab users to identify what the key issues are and how they can improve their practices. They also provide a useful means of highlighting good practice in one lab, and transferring it to others."

13. Case Study - Genentech

Genentech has used an adapted version of the assessment on their South San Francisco site, which has approximately 50 buildings and 15,000 people. The assessments are part of the 'Green BioPharma' program begun in 2011 by EHS Program Manager, Dr. Tse-Sung Wu. The program is supported by Genentech's Sustainability Council as well as the "Green Genes" club, a grassroots initiative that started in 2003 and has 1400 volunteer members.

It also informs and supports the company's commitment to reduce building energy, water, and waste by 20% over two years in two of its research buildings as part of the U.S. Green Building Council's California Best Building Challenge.

Scope – The focus has been single laboratories but several larger departments that have multiple copies of the same lab have also been assessed. Questions on HVAC and lighting were left out because Genentech has a facilities team dedicated to improving energy performance for campus buildings.

Management and Support – The assessment is offered as a service by Dr. Kristi Budzinski, Green BioPharma Project Manager. It is undertaken with senior management approval, and with an internal champion as a point of contact. She provides results based on inspections and discussion with staff, and also a list of action points.

Assessment – Kristi first gives a talk to the whole group so they're aware of what happens and then performs the assessment with assistance from the internal champion. The champion gets the report and is responsible for sharing that internally and achieving any follow up. Suggested improvements have included using a new green product, saving energy by turning off unused fume hoods and other equipment, increasing recycling signage specific to lab type, and making people aware of programs the company has such as surplus chemical sharing program.

Auditing – There is no auditing as Kristi provides a degree of independent scrutiny.

Rating – There were no award levels, just a pass mark. Labs get a certificate stating that they are a 'green lab' and others are encouraged to learn from them.

Follow Up – Labs must implement 50% of the action items to gain recognition. They are given up to a year to do so. There is no assumption that they will go through the exercise again. Good practice that is highlighted by the assessments is disseminated by EHS staff through presentations, training and other means.

Benefits – Kristi Budzinski believes that "The framework is well written and logical and explains why each of the issues is important. We've had to adapt to it our corporate needs and US practice but it's been a great starting point for action. One area it's highlighted as needing more work is waste and recycling. It also stimulated us to start a green chemistry task force."

More information – see an article here.