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Estates Services

Sustainable Design Quality Standards

Version Control Log:

Version	Date	Description	Author	Approval
3.0	18/10/2024	Construction Standard for all New Build and Refurbishment Projects from 2010 onwards	Gaia Group, David Charles	Rufus Logan

1 Introduction

The University of Strathclyde aims to be an exemplar of sustainability. As such , it is important that the principles of sustainable development are considered as part of the design quality and sustainability of built development.

This set of quality standards clarifies the University's requirements for sustainable design. It describes the aspects to be addressed and the targets to be achieved. An Action Plan sets out how sustainability is to be achieved and to promote continual improvement. Roles and responsibilities are identified.

The University expects that all new and refurbishment buildings demonstrate exemplary sustainable design, as far as possible . Buildings and places are expected to fully meet user needs, requirements and expectations. They should also be affordable, healthy and resource efficient, respect biodiversity and minimise pollution and long-term liability.

2 The Standards

The Sustainable Design Quality Standards support sustainable design through attention to contemporary management of the process. It requires commitments and 3rd party appraisals of the design and construction, at various stages.

The Standards identify a number of areas that need to be tackled during the design and construction process. These are listed as headings with detail given under each of these. The Standards embrace issues relevant throughout the project in its design, tender, construction and ultimate handover including aspects such as a sustainable development policy, commitment to design quality, audits of site practice, building labelling, material selection, biodiversity and resources. The targets are in line with best practice.

The benchmark requirements for development are set above the building regulation norm and in the upper region of audit mechanisms such as BREEAM , SKA rating, Net Zero Public Buildings Standard, RIBA Sustainable Outcomes and Considerate Constructors.

The intention is that designers and contractors will address all the issues set out in the Sustainable Design Quality Standards in all new build and refurbishment projects from 2010, and will be encouraged to aim higher if possible. The approach to the performance targets will form part of the competitive appraisal mechanism and a post –completion audit will form part of future assessments of design teams.

Contents

3 Manage The Process

3.1 Construction Site Practice

Requirement: Contractor to agree to 3rd party accreditation of site through Considerate Constructors for new and refurbishment projects. CCS Target minimum score 36.

The construction industry has come under a lot of pressure to reduce its adverse environmental impact at all stages and contractors are now aware of the issues related to site practice. Many clients now expect compliance with performance-based schemes such as the Considerate Constructors Scheme (CCS), which is now used as standard practice for most contractors of any significant size. Many construction companies and client bodies automatically register all their sites.

The Considerate Constructors Scheme is a voluntary Code of Practice open to all construction companies. It seeks to:

- Minimise the disturbance or negative impact (noise, dirt & inconvenience) sometimes caused by construction sites to the immediate neighbourhood.
- Eradicate offensive behaviour and language from construction sites.
- Recognise and reward contractor's commitment to raise standards of site management, safety and environmental awareness beyond statutory duties.

The Code commits contractors to be considerate and good neighbours, clean, respectful, safe, environmentally conscious, responsible and accountable. The aim is to encourage a positive image for the construction industry through competent management, efficiency, awareness of local environmental issues and neighbourliness.

Costs are registration, administration, information gathering, record keeping and others associated with implementing good practice. Costs of registering range from £100/site for project value up to £100K to £600 for projects over £5M. Because it is normal practice these costs have largely been absorbed. Regional awards for the best performing sites and constructors are presented annually.

Sources of further information

http://www.ccscheme.org.uk

3.2 Sustainable Briefing, Management and Audit Policy

Requirement: Contractor and design consultants to provide comprehensive policy, overview of practices, procedures and approach. Contractor to include project targets, key performance indicators and detail site environmental management tools.

Many companies involved in construction activity have sustainable development policies in place at a corporate level to show evidence of their commitment to best practice. They are increasingly a requirement on projects and there will often be an expectation that adverse environmental and social impacts will be monitored. Establishing or upgrading policy should be seen as an opportunity.

Current policy on sustainable development, along with a wide range of source material, can be found through government websites.

Sources of further information

www.constructingexcellence.org.uk

3.3 Post Occupancy Evaluation

Requirement: Contractor and design team to participate in post project evaluation 3 months and 1 year after commissioning. ES to undertake monitoring and reporting on energy consumption and targeting of reductions. ES to undertake satisfaction surveys.

The scrutiny of buildings in use has become an issue of importance in order to provide feedback on the design processes that can deliver improved performance and to provide evidence to support claims about environmental performance.

Practical guidance on post-occupancy evaluation (POE) is not widely available in the public domain. An exception is the series of PROBE (Post-Occupancy Evaluation of Buildings and their Engineering) studies published in Building Services Journal from 1997-2002. The Usable Buildings Trust (UBT) is an independent UK charity that promotes better buildings through the more effective use of feedback on how they actually work. SFC and others are increasingly expecting to see POE reviews to ensure ongoing improvement.

Sources of further information

Scottish Funding Council POE Guidance

3.4 Stage Reviews

Requirement: All stage reviews to include sustainability component.

Project Stage Review reporting should address all aspects of the ES policy to an appropriate level. The review process should include a sustainability component to ensure that issues can be addressed early in the design process. The review process should provide an update on all elements of the standards and provide a forward look at how sustainability aspirations will be addressed up to the next stage review.

Sources of further information

https://cbuilde.com/

www.ads.org.uk

https://www.ourplace.scot/

3.5 Building Label

Requirement: The Net Zero Public Sector Buildings Standard should be targeted and a copy of the certificate displayed at the building entrance. EPC label to be provided.

Market awareness, legislation and government & private sector policy have provided incentives to improve construction practice and to set in place procedures for continual improvement. This has resulted in development of a range of tools and methodologies to promote, assist and measure achievements. Setting performance targets for buildings through 3rd party approved building labelling schemes is an increasing aspect of sustainable procurement.

Sources of further information

https://www.netzerostandard.scot/

https://www.gov.scot/policies/energy-efficiency/energy-efficiency-in-non-domestic-buildings/

3.6 Contractor Travel Plan

Requirement: The contractor should demonstrate how they will seek to minimise travel by site staff and visitors and integrate with public transport and active travel infrastructure.

As part a responsible approach the contractor should have plan in place to reduce the adverse impacts of travel by site staff and visitors.

Sources of further information

University Travel Plan

3.7 Integrated Public Transport

Requirement: Design team to demonstrate how they will ensure any new development is integrated with public transport networks. Assess distance of new scheme from transport nodes.

Provision of good links to public transport is an important factor in improving quality of life and can help developments to meet economic, environmental and social agendas. The campus is well situated but efforts should be ongoing to enhance the experience of public transport through providing good information on services, safety and shelter.

Sources of further information

University Travel Plan

3.8 Private Vehicles

Requirement: Design team to demonstrate how they will ensure any new development is integrated with policy on private vehicles in the University's Travel Plan.

The way in which developments approach the issue of private vehicle use can have a major impact on the quality of public spaces and streets as well as increasing the effectiveness of green transport plans and reducing traffic congestion. Approaches depend on the individual characteristics of the site and can be as simple as providing priority parking spaces for car sharing initiatives. It can be beneficial to create car free zones around buildings and use collective car parks. There are benefits from creating low speed areas and mixed priority streets to provide a safer environment for pedestrians and cyclists. This should be achieved through attention to the overall design of the street environment as opposed to using speed bumps or barriers that can increase anti-social behaviour.

It is important to accommodate the delivery of goods and to ensure that emergency and priority access to properties is maintained.

Sources of further information

University Travel Plan

3.9 Site Waste Management Plan

Requirement: Contractor to provide a SWMP on all projects costing greater than £300,000 in line with the (English) SWMP Regulations 2008 SI 314. Data sheets to be made available to client on request. Target of 100% waste diverted from landfill.

A SWMP sets out how resources will be managed and waste controlled at all stages during a construction project. Much site waste is harmful to the environment and costly to your business. Site Waste Management Plans (SWMPs) will help you manage site waste more effectively, reducing potential harm to the environment and human health.

Contractors undertaking construction or refurbishment work for the university must:

- If, removing their own waste from site, provide a copy of their waste Carrier's Licence to the project team and the University Waste and Environmental Compliance Manager. Details of where waste is taken to must also be provided.
- If utilising a waste management contractor for the removal of waste, provide a copy of their Waste Carriers Licence and a copy of the Waste Management Licence (WML) for the site the waste is taken to. This must be a FULL copy of the WML including all site details and accepted materials, not just the cover page.
- Keep copies of all waste transfer notes (WTNs) and make these available to the university for inspection within a reasonable timeframe when requested. WTNs must be held for a minimum of 2 years (or 3 years if transporting special/hazardous waste).
- As the end of projects, provide a report to the project team and the University Waste & Environmental Compliance Manager detailing all waste removed from site, including Waste type, tonnage and disposal routes (i.e. the percentage of waste recycled, percentage sent to Energy from waste facilities, and percentage landfilled).
- All information should be sent to sustainability@strath.ac.uk

For further information on construction waste and expectations on contractors, refer to the University's Waste Management Policy.

Sources of further information

NetRegs SWMP Guidance

ZWS Reducing Construction Waste

Waste Management Policy

4 Support Community

4.1 Consultation and Community Sustainability

Requirement: As early as possible client and design team to undertake consultation with Building User Groups and liaise with student representatives. Consultation with local community.

In order for a project to be fully sustainable, the affected community of users and neighbours need to be involved with the development. It is important that, as far as possible, projects are delivered in consultation with the wider community, and there is an expectation that primary contractors carry out engagement proportionate to the scale of the development. The University has developed its own Socio Economic Impact and Community Benefits Strategy – The 'Strathclyde Commitment.' All major projects should align with this commitment. Further guidance should be sought from the University's Sustainability & Environmental Management Team, and Procurement Team on delivery of relevant community benefits.

Sources of further information

Estates Services

Strathclyde commitment

4.2 Secured by Design

Requirement: Design team to provide details as per the brief

Secured by Design is an initiative designed to help create safer, more secure environments through meeting a set of core principles. Many designers feel that typical solutions to address the requirements of Secured by Design are a restraint. The best approach for UoS could be a marriage of security and quality in design solutions that embodies an innovative and unobtrusive approach to the creation of secure, quality places where people wish to live and work. It is already a planning requirement. Although designers may wish to become better informed.

Sources of further information

Secured by Design

4.3 Place Making

Requirement: Design team to undertake microclimate analysis and consider exposure of all public spaces to climate variables.

Estates Services' concern is to ensure that the quality and usability of external spaces is in line with best practice. The use of microclimate analysis to optimise space use and planting regimes is required. The Place Standard should be used to assess the quality of the wider place within which the development is being designed.

Sources of further information

Our Place

Greenspace Scotland

Project for Public Spaces

4.4 Agile Working

Requirement: Project team to comply with requirements in the brief and to liaise with ICT representative and Human Resources where necessary.

Agile working at Strathclyde is about managers and staff considering if the work of their teams can be achieved in a more flexible way that allows staff greater scope to work at times and from locations that are preferable to them - within the parameters of at least three days per week working on campus (pro-rated for part-time staff).

Sources of further information

Agile Working

5 Enhance Biodiversity

5.1 Biodiversity

Requirement: Contractor and design team to demonstrate how they will protect existing ecological features on the site, and provide evidence of adherence to local biodiversity plan and University Biodiversity Policy.

Most built development transforms natural environments into places where wildlife struggles to survive, but there is increasing attention to the role that a healthy relationship with the natural environment offers and this is increasingly a requirement of planning. Attention to biodiversity can significantly enhance the quality of the built environment, add value, interest and enjoyment. Measures such as provision of wildlife corridors, use of surface water, native and edible planting, designed breeding areas and avoidance of polluting treatments and materials are typical of good practice to enhance opportunities for native species colonisation.

Further guidance should be sought via the University's Biodiversity Policy. The design team and contractor will be required to comply with the requirements set out in this document.

Sources of further information

University Biodiversity Policy

NatureScot

Measuring biodiversity: research into approaches

Biodiversity Net Gain

5.2 Re-Use of land

Requirement: Design team to provide full site audit of proposals on greenfield sites to ensure overall integrated biodiversity improvement including development fringes.

Greenfield sites are often preferred by developers over brownfield sites because they offer less infrastructural management and built development is consequently cheaper and quicker to deliver. However, this can shift the burden of cost and community enhancement for transport and amenity onto building users and occupants. It may in some circumstances also undermine existing biodiversity which is rarely compensated for elsewhere. However, cramming of development into any urban gapsite is also inappropriate as this may adversely affect existing biodiversity and amenity, rights to light and undermine the urban strategies of which gardens and parks were designed as the lungs of towns and cities.

All proposals should be assessed on their merit so as not to ensure that best use is made of the opportunities offered by brownfield sites.

Sources of further information

Our Place

Biodiversity Net Gain

5.3 Plant Selection and Habitat type

Requirement: Design team to consider local species of plant and wildlife, incorporate chemical free maintenance strategy and avoid need for irrigation. Consider proportion (10%) of edible landscape

The choice of native species and attention to habitat has a huge impact on the future biodiversity and on reducing the demand for water and chemicals. Planting of edible plants adds interest to areas and has the potential to encourage biodiversity. Where there is the potential to create dedicated growing areas within the university as well as creating edible landscaping then this should be pursued. It is important to ensure that the soil and space provision are appropriate to the promotion and successful outcome of this activity.

Further guidance should be sought via the University's Biodiversity Policy. The design team and contractor will be required to comply with the requirements set out in this document.

Sources of further information

Greenspace Scotland

The Royal Horticultural Society

Glasgow City Council Biodiversity

5.4 Timber

Requirement: FSC or equivalent 3rd party label

Use of timber from unsustainable sources threatens the survival of species and damages the natural environment. It also reduces the ability of some threatened populations to maintain their livelihoods. The Forestry Stewardship Council (FSC) is the most effective organisation giving a kite mark to timber internationally and the UK has developed the UK Woodland Assurance Scheme (UKWAS).

Timber should also be free of treatments and toxic preservatives as these can threaten both humans and habitats. It also potentially transforms them into special waste and reduces their value as a future resource. This requires any timber used to be of an appropriate quality and properly detailed.

Sources of further information

FSC

UKWAS

Forestry Commission

Reforesting Scotland

5.5 Integrated Design

Requirement: Design team to show evidence of how plants and trees are used as part of a wider ecological strategy including solar shading and water processing and retention.

There are a range of opportunities to integrate the natural environment with overall building ecology providing amenity as well as environmental benefits.

Sources of further information

Sustainable Sources LLC

6 Create Healthy Environments

6.1 Pedestrians & Cyclists

Requirement: Design to incorporate pedestrian/cycle access to local amenities and provide facilities to aid the mobility of the vulnerable and disabled. Provide infrastructure for safe parking of bikes.

Transportation accounts for an increasing percentage of the UK's contribution to climate change. It is also a factor in health and safety and in quality of places. Many journeys currently taken by car could be taken by low impact transport including walking and cycling. This requires attention to pedestrian dominance, cycle security and safe routes.

Encouraging people to walk or cycle meets a number of objectives related to healthy living and sustainable forms of transport. It is important that new developments add to and improve the cycling and pedestrian infrastructure.

Sources of further information

University Travel Plan

Sustrans

6.2 Internal Materials /Moisture risks

Requirement: Design team to include modelling and passive management of internal humidity as part of design development.

From the standpoint of indoor air quality, upper ranges of relative humidity should be maintained below 60% - dust mite populations increase rapidly at relative humidity levels above 50% and fungal amplification occurs above 65%. Hygroscopic materials such as open grain timber or clay plaster will impact positively in maintaining mid range levels.

This is an important aspect of energy and comfort in indoor environments, and is particularly pertinent to a swimming pool/sports facility.

Sources of further information

https://iaq.works/

6.3 Materials

Requirement: Design team to provide a policy statement on careful selection of healthy materials

There is evidence to indicate that a proportion of commonly used construction materials (both virgin and recycled) are deleterious to the environment but they continue to be used even though alternatives may exist at acceptable cost. Some materials, finishes and treatments may adversely affect health of occupants and can also present a problem to the client at disposal. The distance traveled of materials should also be a consideration as this will is a factor in its embodied pollution. Extraction of materials that threaten human and animal habitats should be avoided.

A suitable specification would take a precautionary approach to the use of materials which may adversely affect health, habitat or the environment at any point in its lifecycle. It would also encourage reduction in adverse environmental impact through minimising transportation and waste.

There are a number of 3rd party approved labelling schemes for procurement of sustainable materials and products. The Scottish Ecological Design Association (SEDA) has published guidance on reduction in chemical toxicity. This advises against the use of materials containing amongst other things CCA and formaldehyde and promotes the use of no VOC paints and finishes.

Sources of further information

Habitable

6.4 Noise

Requirement: Design team to integrate pre-completion testing of noise to comply with performance standards in Approved Document and specific client requirements.

Noise issues are relevant at all stages of a project from the construction process itself to the building to building structure and airborne sound and neighbourhood issues related to (a) proximity of inherent noise producing activity (Busy road – industrial activity) (b) external focusing of sound.

Sources of further information

Scotland's Noise

Noise at Work

6.5 Ventilation

Requirement: Design team to include modelling and option appraisal of ventilation strategies to ensure optimised and well-controlled low energy ventilation strategies on a room by room basis.

The catchphrase for passive buildings is 'Build tight ventilate right' – once a building has been super-insulated – virtually all the heat loss is via draughts. It is therefore essential to make a building airtight – but also to ensure that it can be ventilated to an acceptable standard. Options are open from natural ventilation to hybrid to full mechanical ventilation heat recovery (MVHR) systems. It is important that ventilation is properly designed if housing is to meet stringent health and energy targets.

Sources of further information

BSRIA's Environmental Code of Practice for Buildings and their Services, Numerous Good Practice Guides

Research Report - The Case for MVHR

6.6 Daylight

Requirement: Design team to provide naturally lit internal spaces where possible with optimised, controlled and well-integrated artificial light to contribute to energy saving.

People like daylight and it is one of the major contributors to a sense of well-being. Well-designed lighting and daylighting can be one of the most cost-effective energy efficiency measures provided they are well integrated and controlled. There has been much written in recent years on the health benefits of daylight. Attention is required to daylight quality and distribution, as well as controls. Discomfort glare should be avoided and consideration needs to be given to issues of privacy.

Sources of further information

BSRIA's Environmental Code of Practice for Buildings and their Services, Numerous Good Practice Guides

7 Mimimise Pollution

7.1 Embodied carbon

Requirement: Design team to demonstrate how they have considered embodied carbon in their design development. A full Life Cycle Analysis (LCA) should be conducted at design stage.

Embodied carbon is the amount of carbon emitted to take a material from its original location and state, through transport and manufacture to installation. Evaluating embodied carbon impacts can influence materials specification.

Further guidance should also be sought from the University's Net Zero Carbon Management Plan.

Sources of further information

University's Net Zero Carbon Management Plan

Greenspec

RICS Whole Life Carbon Assessment

7.2 Climate Change Adaptation and Reduction in Surface Run Off

Requirement: Design team to provide robust solutions for climate change adaptation and the management and creative use of rain water.

Scotland and Glasgow are leading the way in their collaboration on climate change adaptation and resilient communities. Glasgow was named one of Rockefeller Foundations 100 Resilient Cities and the Our Resilient Glasgow Strategy was developed with Strathclyde as a leading partner.

It is therefore of paramount importance that any development that Strathclyde builds is contributing to the City's strategies for Climate Change Adaptation and resilience.

Sustainable urban drainage is now well established as a means of control of both flooding and diffuse pollution. The aim is to slow down run-off of surface water. This can be achieved in a creative manner. Surface run-off can be used for watering landscape and to aid sewage management through dilution and so can make a vital aesthetic contribution to a place and save money on infrastructure.

Sources of further information

SEPA Diffuse pollution in the urban environment (SUDS)

Construction Industry Research and Information Association

University Climate Change Adaptation Plan

Climate Ready Clyde

Resilient Glasgow

7.3 PVC, uPVC and Halogenated Plastics

Acceptable Level: Design team proposals to avoid PVC and halogenated plastics with exceptions in electric cables and the sewage system.

Polyvinyl chloride (PVC) is used in a variety of applications. It is dangerous to human health and the environment throughout its entire life cycle. When produced or burned, PVC releases dioxins, a group of potent synthetic chemicals. Many vinyl products contain additives to change the consistency of the product. Some additives can leach out of products and phthalate plasticizers - added to make PVC flexible - have been of particular concern. PVC is found ins Electric wires, Pipes, Portable Electronic Accessories and plumbing and building materials. In every case alternatives exist. In applications where smoke is a major concern PVC-free LSOH (low-smoke, zero-halogen) cable insulation has been preferred for some time and LSOH cable is now widely available.

Sources of Further Information

Scottish Ecological Design Association

Greenspec

7.4 Timber Treatment

Requirement: Design team proposals to avoid wood preserver except beech distillates or CKB-salts (chromate/ potassium/ boric acid) outside the building or use of acetylated timber

Most traditional timber treatments are known to have adverse environmental impacts. Options available are to use the safer products identified, or appropriate detailing to prevent unwanted structural degradation. A number of new wood products are also worth investigating such as those from acetylated timber.

Sources of Further Information

Centre for Alternative Technology

Scottish Ecological Design Association

Built Environment, Smarter Transformation

7.5 Use of Recycled materials

Requirement: Design team proposals to include option appraisal of opportunities from assured nontoxic sources

There is extensive guidance on the use of recycled materials in construction and target setting is increasingly common. An emerging problem is that polluting materials are being recycled to avoid the cost of safe disposal and this could lead to introducing pollutants from other industries into the built environment. The potential for recycled materials will be dependent on the scale and type of project.

Sources of further information

WRAP

7.6 Light Pollution

Requirement: Design team proposals to provide operational statement for exterior lighting. Lights optically set to distribute light to required area only and minimise occurrence of obtrusive light.

Negative impacts of external lighting can be reduced through appropriate management and result in energy saving. An operational statement might include controls to dim or switch off lights when not required, appropriate placing and optically setting the lights so that they only distribute light to the required areas.

Obtrusive light is defined as the portion of light from a luminaire that does not serve the intended function. Obtrusive light includes sky glow, glare, light spill beyond boundary and flicker. Measures to reduce light pollution minimise the negative effects of nighttime lighting. Obtrusive light calculations can be used.

Sources of further information

Indoor Lighting Equipment

UK Gov Light Pollution Guidance

7.7 NOx

Requirement: Design team proposals to incorporate equipment with NOx less than or equal to 250 mg/Nm3.

Nitrous oxides are a contributor to environmental pollution and acid rain. The target set should be best practice. This may be readily achieved if there is no gas central heating system.

Sources of Further Information

SEPA - Medium Combustion Plant Directive

EU Directive 2015/2193

7.8 F-gases

Requirement: Design team proposals to identify F-gas substances used in the construction and operation with a plan for minimising the global warming potential (GWP) of any f-gases used.

Fluorinated gases are often used in refrigerants. They are therefore to be avoided as per the regulations that apply. They also become a significant problem at disposal.

Sources of Further Information

Fluorinated gas (F gas): guidance for users, producers and traders

8 Use Resources Effectively

8.1 Primary Energy

Requirement: Design team to propose a target for primary energy use in line with the project brief and consultation with the Sustainability team.

Radical conservation of resources (land, water, energy and materials) is a fundamental aspect of sustainable design. Passive design is seen as making a significant contribution and hence attention to Passivhaus design principles is key.

Sources of further information

RIBA Sustainable Outcomes

Net Zero Public Buildings Standard

Eco-minimalism: The Antidote to Eco-bling, Liddell, H., 2008 RIBA Publishing

8.2 EPC Rating

Requirement: 'A' rating for new build, 'B' rating for refurbishment

An EPC provides a rating of energy efficiency, and carbon emissions based on the condition of a building. An EPC can identify energy saving improvements that can be undertaken to improve the energy efficiency of the property, reducing the running costs and the carbon emissions. The EPC assessment results are shown by the use of a performance certificate similar to those used for domestic appliances such as fridges, freezers, washers etc. A sliding scale of 'A' to 'G' is used, where 'A' is equated to being the most energy efficient and 'G' being less efficient.

Sources of further information

Energy efficiency in non-domestic buildings

8.3 Energy Monitoring

Requirement: Metering strategy to be agreed with Sustainability Team. Demonstrate meter placement by occupancy & tenancy. Data transfer & communications must be addressed. Metering must integrate with University's AMR database and METERology portal.

Sub-metering is a vital part of energy monitoring and targeting. It helps determine the specific consumption of different building services enabling facility managers to make informed decisions about performance and energy efficiency.

The metering strategy for the building should be agreed in consultation with the University's Sustainability Team.

Sources of further information

CIBSE TM39 Building Energy Metering (a guide to energy sub-metering in non-domestic buildings, 2006)

METERology

8.4 Fabric Performance – Insulation

Requirement: Design team proposals to include a cost benefit analysis for Passivhaus certified insulation levels compared to compliance with building regulations.

Improvement in fabric performance is one of the most cost effective energy efficiency measures. When undertaken thoroughly it should be possible to recoup capital costs by reduction in mechanical heating and cooling services installation.

Sources of further information

Passivhaus Learning Hub

Thermal Insulation of Passive Houses

8.5 Fabric Performance – Airtightness

Requirement: Design team proposals should target airtightness in line with Passivhaus for new build and EnerPHit for retrofit unless otherwise stipulated in the design brief.

With air tightness, costs are essentially to get up the learning curve but once detailed the additional costs are negligible. Contractors are increasingly aware of the need for airtightness as a fundamental aspect of energy conservation.

If they lack experience, contractors will need to learn detailing of air-tightness initially but once established and validated then costs are absorbed within the design process. There are costs associated with providing additional insulation and perhaps with achieving solar gain but this can be recouped by reduction in services.

Sources of further information

Demystifying Airtightness Good Practice Guide (2020)

8.6 Heating

Requirement: Design team proposals should model cost and carbon of low and zero carbon technologies and compare to connecting to the University's gas-fired heat network. Flow and return temperatures should be designed to be compatible with a heat pump lead heat network.

Energy for heating has reduced as thermal performance standards have increased but further improvements can be delivered from good airtightness and careful selection of efficient equipment and incorporation of good control.

Sources of further information

Passivhaus Learning Hub

8.7 Renewable Contribution

Requirement: Design team proposals to incorporate option appraisal and proactive pursuit of best value options

Caution is required to ensure that decision-making on energy supply strategy is sensible and cost effective. It is important that passive measures of energy conservation precede generation. Considerations should include build quality and conservation strategies - improved insulation, solar management, air tightness to prevent draughts in winter and overheating in summer, control of electrical demand through product specification, daylighting and circuit control. Ideally demand should be reduced such that renewables are affordable rather than a threat to commercial viability. Financial support by way of government grants available for micro-renewable technologies is rarely sufficient to make them viable.

Sources of further information

Eco-minimalism: The Antidote to Eco-bling, Liddell, H., 2008 RIBA Publishing

Passivhaus Powerhouses

8.8 Electrical Energy and Standby

Requirement: Proposals to incorporate low energy LED lighting throughout and all electrical equipment with 'A' rating and 7 day control. Instructions on use.

Standby power is the energy used when equipment is not performing its primary task and is thought to amount to up to 13% of UK domestic electricity consumption. There are a number of initiatives to reduce this through additional controls and redesign of components. Motors, pumps and variable speed drives should be chosen for optimum efficiency and reliability. As the specification systems are changing as more manufacturers provide more and more efficient goods this benchmark will be raised over time.

Sources of further information

Standby Electricity

8.9 Low Energy External Lighting

Requirement: Design team proposals to incorporate all external lighting (except security) to have an efficacy of at least 150 lumens/circuit watt, designed to avoid night pollution and controlled through daylight sensing.

Lighting is a very significant aspect of the carbon footprint of a building and an increasing aspect of power requirement and energy consumed. External lighting can be a significant consumer of energy as well as a major factor in night erosion.

Sources of further information

Carbon Trust

CIBSE

Indoor Lighting Equipment

8.10 Water consumption

Requirement: Design team proposals to incorporate low water use fittings. dual flush toilets and rainwater collection options appraisal. Water consumption benchmarks based on assumed occupancy to be in line with best practice.

Conservation of water is invariably more cost effective than recycling and re-use, although there may be scope for elements of each in any particular context. Rainwater harvesting can make sense in some circumstances but frequently security of supply generally requires dual provision and hence dual expense. To maintain a cost effective design-approach the intention is to slow surface run-off of rainwater in order to be able to use it as a resource.

Sources of further information

Water Technology List

8.11 Waste Plan

Requirement: Design team proposals to incorporate robust plan for waste and recycling in line with University targets. Design team proposals to incorporate provision of internal or external separation and storage.

There is increasing attention to minimising the amount of waste going to landfill through resource management and recycling and ever more stringent regulatory requirements. It is highly likely that fiscal measures will increasingly be used to encourage recycling. The potential exists at UoS to promote an exemplar of waste management. There is a high level of support within the university community for increased recycling facilities.

Contractors should refer to section 3.9 of this document, and the University's Waste Management Policy for further information and guidance.

Sources of further information

Waste Management Policy

www.letsrecycle.com/

Zero Waste Scotland

8.12 Landfill

Requirement: Design team to demonstrate how they have sought to minimise quantity of waste going to landfill

Landfill represents a waste of resources and an avoidable expense. By careful design detailing and avoidance of materials that cannot be re-used or recycled the amount of material going to landfill from construction can be radically reduced. The benchmark figure needs to be established.

Sources of further information

http://www.ccscheme.org.uk

WRAP

8.13 Solar Design/ Orientation

Requirement: Design team proposals to incorporate bio-climatic approach to sun and shelter to save energy.

The orientation, massing and landscaping aspects of buildings can contribute significantly to the overall energy budget of a building through conservation, heating and cooling. In order to assess the contribution and to ensure the right balance between solar gain and minimising overheating the design should be modeled. There are a variety of approaches to the modeling and the architects will provide a range of responses, which will need to be analysed.

There are costs associated with modeling but these will increasingly be absorbed within the overall design process.

Sources of further information

ESRU Passive Solar

8.14 Adaptability and multi-use of space

Requirement: Adaptability in open plan versus cellular spaces

Designing for flexibility is an important aspect in modern building design to accommodate restructuring as well as changes in use. It will help to future proof against additional construction costs associated with renovation.

Sources of further information

University Space Management Policy

8.15 Design for Re-use/ Deconstruction

Requirement: Design team proposals to specify reclaimable items

Detailing for the deconstruction of buildings is becoming increasingly important as part of Scotland's commitment to reduce construction waste and increase construction efficiency. The technique was implemented at Glencoe Visitor Centre and since then guidance has been produced which includes standard details (see sources of further information).

Sources of further information

Scottish Ecological Design Association

Glencoe Visitor Centre - Gaia Architects

With thanks to

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