

University of Leeds

Sustainable buildings design, construction and refurbishment standard

February 2014

The construction of new University buildings and the refurbishment of our existing estate are important contributors to University sustainability, from the social, economic and environmental opportunities and impacts inherent in the construction process, to the future life of the new building or refurbishment. The way we construct our buildings not only influences our success in meeting carbon reduction and other sustainability targets, but also forms the spaces where we inspire and create change through the education of our students, our cutting edge research, and engagement with the wider community.

This policy covers all new building developments and refurbishments with a value over £1.5 million¹. For Backlog Maintenance over this value the guide only refers to elements being replaced. The purpose of this guide is to:

- Set university standards for sustainable design and construction for major developments
- Define minimum technical standards

Its objectives are to:

- Ensure our construction is at the 'cutting edge' and supports the University's Sustainability Strategy aspirations
- Increase energy efficiency and reduce carbon emissions
- Reduce mains water usage
- Consider the environmental, social and economic impact of materials used in the development
- Improve and enhance existing buildings and design for long life, low maintenance and energy efficiency
- Control both the quantity and quality of surface water as close to its source as possible through sustainable drainage systems
- Provide adequate space for reuse, recycling and composting
- Monitor and penalise pollution
- Measure, integrate and enhance biodiversity
- To ensure measures are in place to facilitate safe and sustainable travel
- Require considerate and efficient construction site practices
- For the development to have a positive impact on the economic, social and environmental well-being of the local area
- Provide usable buildings designed to facilitate sustainable behaviour

Sustainable design principles will be incorporated into all projects from conception through to construction and operation. Tender documents and contracts will embed these through unambiguously worded requirements. Project management will ensure the designs are delivered through all stages of projects, and commissioning will demonstrate compliance against performance targets.

Many of the features of high performance buildings which reduce environmental impacts are complementary rather than conflicting with other building requirements. For example:

- Optimised use of daylight, in bright, airy, buildings with views of the outside, has positive psychological effects on most users; creates a sense of connection with the natural world and the diurnal cycle that has measurable effects on learning outcomes in teaching rooms and libraries; reduces eyestrain and other adverse effects of artificial lighting; and has low electricity consumption for illumination.

¹ Construction work under this value will be covered by a separate guidance document and supporting checklist.

- Use of natural ventilation, rather than mechanical ventilation or air conditioning, reduces the costs and environmental impacts of energy consumption; and the maintenance burden associated with complex equipment.
- Maximum use of natural, sustainably produced, materials reduces environmental impacts; has positive psychological effects on most users; and avoids the harmful emissions associated with some man-made building materials, finishes and cleaning materials (e.g. in adhesives, solvents and plastics).
- A high level of metering and monitoring highlights opportunities to reduce energy and water consumption; identifies problems in building operation; and can provide rich information for use as a teaching resource in undergraduate and specialised postgraduate courses.
- High levels of flexibility - if uses can be more easily changed over time there is an environmental benefit of longer lives for existing buildings, and less need for new ones; and a financial benefit of avoiding high costs for renewal or replacement.
- Designing and sizing building systems and equipment on the basis of well-understood needs, and careful modelling of their interaction, rather than 'rule of thumb' assumptions, can result in reduced capital and operating cost, easier maintenance, and lower energy consumption.

The minimum standards for major developments are summarised below. All standards require inclusion in project inception, feasibility, design, construction and commissioning stages.

1 Project minimum sustainability standards

Issue	Standard to be achieved
Sustainability Management	<p>The designer must implement an auditable management system to prompt and track sustainability throughout the design and development process including setting benchmarks for occupancy studies.</p> <p>The designer/contractor will report at each gateway against each relevant section in this guide.</p> <p>The University will require the contractor to prove throughout the design process this was developed and implemented. Project management, building commissioning and post project reviews will be used to confirm objectives and standards are achieved. Internal reviews by University Sustainability will occur at key points throughout the development process and at handover.</p>
BREEAM	New developments must achieve a BREEAM Excellent rating.
CO ₂ Targets	Total CO ₂ emissions shall be less than 15kgCO ₂ /m ² per year for regulated energy in new build and 22kgCO ₂ /m ² per year in refurbishments.
Total Energy use	The total regulated energy use for the building shall be less than 50kWh/m ² /yr for new build and 80kWh/m ² /yr for refurbishments.
Considerate Construction	The Contractor must be registered with the Considerate Constructors scheme and must achieve a score of above 35 by the end of the construction phase of the works.
Life Cycle Assessment (LCA)	LCA must be carried out on key building elements.

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The following standards shall be achieved in all construction and refurbishment contracts over £1.5 million. Backlog maintenance projects over this value should refer only to elements being replaced.

2.1 Energy efficiency and climate change mitigation

Issue	Standard to be achieved
CO ₂ Emission Target	The building shall be designed to operate in a manner that minimises carbon dioxide emissions. These shall not exceed 15kgCO ₂ /m ² per year for regulated energy in new build and 22kgCO ₂ /m ² per year in refurbishments.
Massing	The building must be designed to maximise heat exchange potential and building operational efficiency.
Building Orientation	The design must demonstrate the optimisation of the available site to enhance wherever possible day lighting and natural ventilation potential whilst accommodating any acoustic issues.
Insulation	Low U value components must be used, with the average U value for the whole building including the external fabric, glazing, windows, roof, walls and floors to be 25% above current building regulations for new build and 0.25W/m ² /°C maximum for refurbishments.
High Thermal Mass	<p>Use is to be made of the internal exposed high thermal mass of building structures to absorb heat energy.</p> <p>This high thermal mass is to be taken into account in the design any heating / cooling and ventilating systems to reduce plant and system size.</p>
Air Leakage	For new buildings the amount of air leakage shall be minimised to be below 3 m ³ /hr/m ² @50Pa to reduce the building heating / cooling loads as per best practice in CIBSE TM23. For refurbishments the amount of air leakage shall be minimised below 10 m ³ /hr/m ²

Energy Consumption of Appliances and Electric Motors	All electrical appliances and fixtures must be energy efficient and rated at a minimum A+. Electric motors for fans and pumps etc. above 1.0 kW shall be premium efficiency (IE3) and variable speed, with separate individual inverter controls complete with harmonic filtration.
Ventilation Efficiency	<p>Natural passive ventilation utilising one side, low/high window openings, cross ventilation or stack ventilation shall be used as the highest priority and where mixed mode mechanical ventilation is necessary, efficient air to air heat recovery methods shall be used with a minimum efficiency of 80%.</p> <p>Supply and extract air ventilation systems shall incorporate high efficiency air to air heat recovery methods such as thermal wheels.</p> <p>DX type cooling is to be avoided in all office type applications unless express permission is given from the Head of Estates.</p>
Plant Energy Usage	Modular plant and equipment such as boilers, pumps etc. shall be sized to operate at maximum efficiency and used to enable plant to be turned down to match building loads out of season.
Site Renewables	Low carbon energy generation should be reviewed as part of the project. Technologies should be included if they meet required pay-back or if they have wider strategic benefits, such as University research or teaching related to the technology.
Natural Day Lighting	<p>Window and glazing design is to be such that maximum daylighting is provided to the occupied areas whilst solar gain is reduced by shadowing and natural shading forms of solar shading, external blinds / brise soleil and solar control glazing with heat reflective properties and internal mid pane blinds.</p> <p>Light tubes shall be considered for providing daylight in building interiors, corridors, lavatories etc.</p> <p>Daylight factors of 5% are to be achieved as set out in BRE Good Practice guide 245 with due respect to life cycle costing.</p>
Artificial Lighting	<p>Internal lighting designs shall minimise energy usage and shall use dedicated energy efficient fittings (minimum T5 and LED where appropriate) with automatic (daylight, constant lux, absence and presence detection) lighting controls in all areas. Manual controls to be provided as appropriate. External lighting – shall be white light and use LED fittings to align with the University campus wide philosophy. External area lighting to only use energy efficient fittings and to minimise light pollution. Security lights shall be LED complete with PIR controls where appropriate and daylight sensors and control strategy must be agreed by University security service. All other external lights to use energy efficient fittings with appropriate daylight shut off/ hold off devices.</p> <p>Lighting shall be in accordance with University lighting policy.</p>
Building Management System	<p>A fully tested and commissioned Trend Building Management System (BMS) must be provided to ensure that all building systems can be closely controlled and monitored. Systems will be commissioned in both the heating and cooling seasons and on an annual basis to further improve performance.</p> <p>The BMS is to be connected/integrated into the Campus wide Trend network.</p> <p><u>Control strategy</u></p> <p>There will be adequate space temperature sensors installed to cover all</p>

	<p>elevations of the building to give a reasonable average space temperature for the associated zone.</p> <p>Optimum Start Stop modules will be used for all heating zones. Variable Temperature circuits will be compensated to outside air temperature. Cascade control will be used on air handling units where space temperature setpoint will have limits 18°C and 24°C.</p> <p>All BMS must be in accordance with the University Building Management System policy and design guidelines.</p>
Metering	All metering must be in accordance with the University metering policy.
User Controls	<p>The building shall allow for users to have some control over their internal environment. This can be via openable windows in summer etc. The users shall in general be able to control their internal environment as set out below.</p> <p>[a] Temperature: +/- 2 °C either side of the BMS set point [b] Ventilation/air quality +/- 10% either side of the BMS set point.</p> <p>Thermostatic radiator valves must have anti tamper proof limiting pins.</p> <p>All controls must be in accordance with University controls policy.</p>
Plant Efficiencies and Zoning	<p>Plant equipment and engineering systems must be specified and designed to operate efficiently under part loads. Typically plant and equipment must operate at an average efficiency of no less than 87% when at 25% of full load capacity.</p> <p>Zoning of the environmental building systems is to be maximised such that small areas of the building can operate efficiently independently.</p>
Internal Design Conditions	<p>From May 30 to September 30 and from 0900 to 1630, Monday to Friday, there should be no more than 120 hours when the internal air temperature in the building rises above 28°C.</p> <p>Internal design conditions for occasionally let space to be agreed with Central Teaching/Conferencing teams, although the general principles as above should apply.</p> <p>The average internal to external air temperature during occupied hours shall not exceed 5°C difference during this period.</p>
External Design Conditions	<p>Summer 30°C db 22°C wb Winter -3°C Sat CIBSE degree data for Leeds shall be used in designs.</p>
Plant Selection and design	The design and choice of equipment shall be selected to maximise the possibility of grant funding/discounts. If grant funding is available during the course of development, design and construction the developer will be required to provide information and submissions to support the application process.
Data Centres	<p>Requirements must be discussed with ISS at feasibility stage as the University is working to centralise data centres.</p> <p>Evaporative cooling or other low energy systems must be used to minimise environmental impact of running centres that are incorporated into the building.</p>
Laboratory space	Laboratory designs should be referred to the University sustainable laboratory group for comment.
Accessible doors	Accessible doors for disabled use should be fitted with fob controls and buzzer/phone link to reception to enable remote door release.

Entrance foyers	Draught lobbies should be provided to all main entrances. Door control should not be by presence detection to avoid accidental opening through passing traffic.
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2.2 Sustainable use of Water

Issue	Standard to be Achieved
Improving Water Efficiency	<p>Designer/contractor must refer to University Water Policy.</p> <p>Developments must reduce the total water consumption to < 5m³ per person per year. This is to be achieved through the use of dual flush WCs, percussion low flow taps, automatic flow regulators and the design of systems.</p> <p>Products from the ECA Water Technology list shall be used and available grants claimed.</p>
Rain Water Harvesting	Rainwater collection for irrigation should be considered as part of the development.
Flood Risk from Surface Runoff	The development shall avoid surface run off (if localised flood risk is an issue). Sustainable drainage principles (SUDS) shall be used in the design considering as a first resort options such as soak-a-ways etc aiming to minimise discharge to drains. SUD work should also consider the potential to impact positively on University biodiversity.
Flood Risk from Water Courses	The development must avoid increasing the risk of flooding from water courses and minimise the risk of surface and ground water pollution.

2.3 Minimise use of materials and optimise sustainable sourcing

Issue	Standard to be achieved
Recycled Content	All developments must use the WRAP process for assessing the recycled content of the proposals. A minimum of 30% recycled content by value is required. Contractors are requested to include recycled content over and above this standard as a consideration within the tender, which will be scored as part of the quality aspect of the submission.
Sourcing Materials produced locally	All developments must target sourcing at least 40% of the total value of the building's materials from local suppliers. All contractors/suppliers shall minimise emissions from transport when sourcing materials.
Environmental Impact of Materials	<p>All the main elements of the building must obtain an A rating from the Green Guide to Specification and BRE guidance. Materials with a low carbon footprint shall be utilised wherever practicable including.</p> <ul style="list-style-type: none"> • Roofs • External walls • Internal walls and partitions • Floors • Windows • External surfacing • Boundary protection
Sourcing Basic Building Elements	<p>The majority of materials in the following basic building elements must be responsibly sourced.</p> <ul style="list-style-type: none"> • Frame • Ground floor structure • Upper floors structure • Roof structure and finishes

	<ul style="list-style-type: none"> • External walls • Internal walls • Foundations/substructure <p>This means:</p> <ul style="list-style-type: none"> • Low and VOC free products • All timber must be FSC or equivalent certified • Made of recycled materials where appropriate • That cradle to cradle certified products have been assessed for suitability for use (http://c2ccertified.org/products/registry) • Avoiding known toxic materials that are injurious to human and ecosystem health • Consideration of future re-use or recycling of materials and avoiding use of composite materials • Sourcing from local suppliers where possible to reduce transport emissions and support the local economy • Materials are EMS certified (ISO14001, EMAS) for their manufacture and supply base <p>BES 6001 standard should be used for appropriate materials with aim to achieve 'Very Good' or higher.</p>
Sourcing of Secondary Building and Finishing Elements	<p>The majority of materials in the secondary building and finishing elements shall be responsibly sourced.</p> <p>These include:</p> <ul style="list-style-type: none"> • Stairs and associated ancillaries • Windows and associated ancillaries • External and internal doors and sub frames • Skirtings • Panelling • Fitted Furniture • Facias • Paints • Any other significant use <p>This means:</p> <ul style="list-style-type: none"> • Low and VOC free products • All timber must be FSC or equivalent certified • Made of recycled materials where appropriate • That cradle to cradle certified products have been assessed for suitability for use (http://c2ccertified.org/products/registry) • Avoiding known toxic materials that are injurious to human and ecosystem health • Consideration of future re-use or recycling of materials and avoiding use of composite materials • Sourcing from local suppliers where possible to reduce transport emissions and support the local economy • Materials are EMS certified (ISO14001, EMAS) for their manufacture and key supply base.
Furniture	Sustainability to be contacted at beginning of project to help review re-use of furniture potential (e.g. re-upholstering) within the building.

	<p>If furniture is not suitable for re-use within the building Sustainability will work with project manager to distribute through re-use@leeds and as a last resort use a contractor such as 'Over2Hills' who will be able to re-use or recycle the furniture on our behalf.</p> <p>Any tender for new furniture should split 'standard' furniture from furniture with bespoke/design element. Sustainability will support tender for furniture.</p>
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NB: For reasons of the standardisation/maintenance certain systems will be named/required by the University these are likely to be the: Computerised Building Management System, Fire Alarm, CCTV and intruder alarm. This is not an exclusive list and may be added to as required.

2.4 Enhancing connectivity and sustainable transport

Issue	Standard to be achieved
Travel Plan	Development must refer to University Travel Plan and ensure that it meets its key objectives. Sustainability must be contacted at beginning of development.
Travel information	Travel information point/display to be provided and a local travel plan co-ordinator to be appointed on occupation.
Reducing the Need for Travel	Ensure that at least one meeting room in the building is suitable for video-conferencing.
Walking Routes	<p>Ensure all walking surfaces are non-slip with a rating of R11 or greater (DIN 51130).</p> <p>Ensure all walking routes are well lit, footpaths should be lit to at least 10 Lux average and footpaths adjacent to roads should be lit to at least 20 Lux average.</p> <p>CCTV must cover all footpaths.</p>
Cycling Routes and Facilities	<p>Appropriate level of cycle parking aligned to travel plan cycling targets to be incorporated into development. Location and numbers must be agreed by Sustainability.</p> <p>Cycle access requirements must be considered as part of development.</p> <p>Clear signage for cycle routes and cycle parking facilities to be provided for all development.</p> <p>Showers with changing/drying areas & lockers as appropriate must be provided for the use of cyclists and walkers in all new developments and major refurbishments.</p> <p>There must be a net gain in cycle parking due to the development.</p>
Public Transport	Facilities showing up to-date public transport information must be made available with real time public transport departure information available in new high profile developments.
Parking	Parking adjacent to building entrances must be provided for disabled building users. Totals will be agreed with the University's Equality Service. Any additional parking adjacent to building should prioritise car-sharers.

2.5 Minimise Occupancy Waste / Maximise Re-use and Recycling

Issue	Standard to be achieved
Waste management throughout construction	<p>Site Waste Management Plans must be produced for all projects over £300k and shall include reduce/reuse/recycling targets that incorporate best practice.</p> <p>Targets have been set that cover all projects. Capital projects over £300k must achieve 90% recycling rates, refurbishments up to £300k must achieve 80% and small projects (M&O) must achieve 50%.</p>
Disposal of construction waste	<p>The University has a list of approved skip companies that have been assessed for recycling levels which can be recommended for use within contracts.</p>
Diverting Waste from Landfill	<p>This section is relevant to new build/complete refurbishment of building only.</p> <ul style="list-style-type: none"> • Internal recycling facilities must be installed in areas which they will not compromise fire safety and not more than 20m from each work area. These must be accessible to disabled people. • Enough bins must be provided to segregate: paper/card, plastics, metals/cans, food waste (for composting), glass, general waste. These bins must be a minimum of 50 litres each, except for food compost collection. • New external bins located near entrances must allow for segregation of waste. • Dyson air blade type hand dryers must be supplied to washroom and toilet areas.
Re-use of materials	<p>The designer/contractor must look for opportunities to re-use within the development and report on progress. Services such as http://sitesurplus.co.uk can be used to help meet this requirement.</p>
Waste/recycling facilities	<p>All fixed facilities (internal and external) must allow for recycling as well as the disposal of general waste.</p>

2.6 Biodiversity

Issue	Standard to be achieved
Improving biodiversity on University owned sites	<p>All developments must have a net-positive impact on University biodiversity and compliment the University Biodiversity Action Plan.</p>
Enhancing habitat	<p>Any planting must incorporate a mix of native species, trees should be native if possible (or if not to have proven biodiversity benefits) and include a mixture of fruit and seed bearing species.</p> <p>Planting should maximise the complexity of vegetation structure by planting a mixture of plant forms such as grasses, herbs, shrubs and trees.</p> <p>Opportunity should be considered to plant 'butterfly bars' that contain an abundance of flowers with different structures, including open, flat flowers for generalist species, and tubular flowers for more specialist pollinators such as long-tongued bumblebees. Avoid double-flowered cultivars that provide little or no nectar or pollen resources.</p> <p>Review the potential for mixed hedgerows to be incorporated into the development.</p> <p>Planting, especially cover such as shrubs and hedgerows, should aim to link</p>

	up with other similar areas in order to create wildlife corridors.
Nesting sites	Identify potential for log piles, bee hotels etc within the development. Asses the potential for bird boxes, nesting sites within the development.

2.7 Social and economic value

Issue	Standard to be achieved
Local employment opportunities	The contractor will look to maximise opportunities for local employment in site construction and through the supply base. This should include: <ul style="list-style-type: none"> • Creation of employment opportunities for long-term unemployed or NEETs • Offering paid work placements to young adults • Providing additional opportunities to individuals or groups facing greater social or economic barriers
Regional economic development	The contractor will look to create supply chain opportunities for local SMEs and social enterprises.
Supporting skills and training opportunities for local workforce.	The contractor will look for opportunities to support the following: <ul style="list-style-type: none"> • Creation of skills and training opportunities (e.g. apprenticeships and on the job training) • Providing career advice and information for young people (including University students) interested in related careers.
Living wage	All operatives including suppliers and sub-contractors must, as a minimum, be paid the living wage of £7.65 (January 2014). The living wage is updated annually and can be checked here - http://www.livingwage.org.uk/what-living-wage

2.8 Post occupancy

Issue	Standard to be achieved
Review dates	Post-occupancy review dates to be agreed at handover and be used to inform future projects.
Seasonal re-commissioning	The buildings services will be re-commissioned on a quarterly basis agreed at project handover.