Sustainable Building Design Standard

Appendix A: Managing Sustainable Projects

This Appendix of the UoS Sustainable Building Design Standard is written principally for those who are involved in the management of design, construction and maintenance projects.

It is structured to ensure that sustainability requirements are effectively incorporated from the earliest project stages. This helps to minimise administrative burden whilst avoiding the need for corrective action later on. Importantly, it also helps to maximise the value that can be achieved.

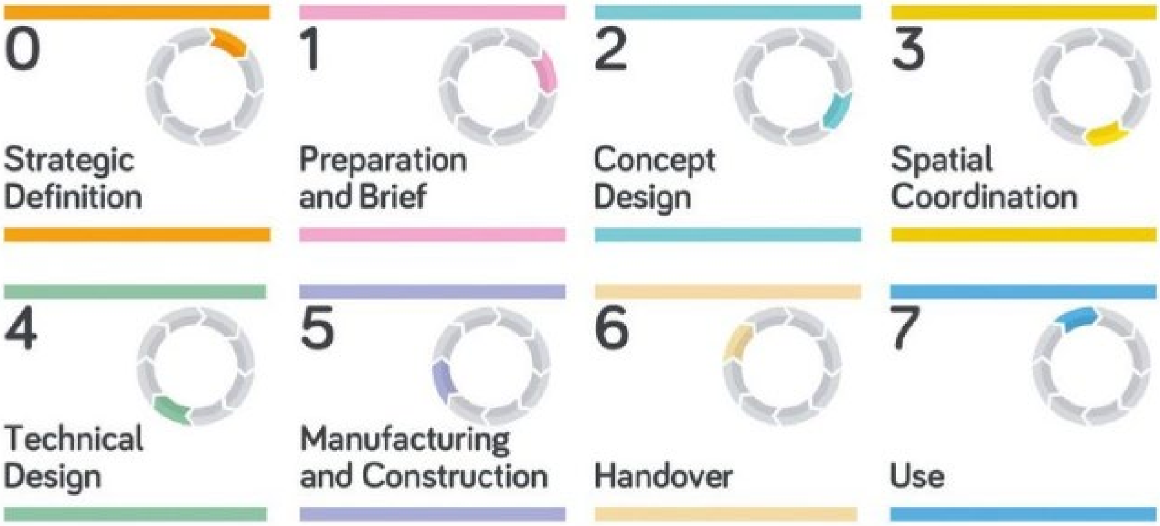
Project managers are responsible for ensuring all relevant requirements are covered. Table 1 summarises roles and responsibilities for design and approval of projects:

Table 1 – Roles and Responsibilities

Role	Responsibility
University Executive Board (UEB)	• Sets overarching requirements; provides guidance and assurance • Overall responsibility for compliance and audit
Estates Programme Board (EPB)	• Approves strategy, reviews progress and agrees deviations/ mitigation • Oversees assessment and audit process/ monitors progress • Provides guidance on access and inclusion • Receive project updates from Programme Co-ordination Board
Sustainability Strategy Board (SSB) and Sustainability Implementation Group (SIG)	• Assesses carbon impact against Sustainability Strategic Plan goals and targets • Requires provision of emissions impact assessment (Carbon Appraisal) and performance data for reporting purposes
Programme Co-ordination Board	• Review active and proposed projects • Establishes project teams • Advise on impact on changes to project scope • Report to EPB
University Project Manager/	• Implements the requirements of the UoS Sustainable Building Design Standard

Role	Responsibility
External Project Manager	• Manages Soft Landings process/ appoints Soft Landings Champion • Ensures that requirements are included in project documentation • Ensures that the correct assessment methodologies are applied • Arranges sustainability meetings/ workshops • Report on progress and relevant data to Programme Co-ordination Board
Sustainability Consultant/ BREEAM or Ska Assessor (where appointed)	• **Must be appointed no later than RIBA Stage 1 on major projects** • Ensures that the project is delivered in accordance with the UoS Sustainable Building Design Standard • Facilitates sustainability workshops; assigns responsibilities; sends reminders; and provides regular written updates. • Provides leadership on sustainability objectives and assessments, with support from SIG and the UoS Environmental Management System • Challenges the project team to optimise sustainable design and construction and identify opportunities for innovation • Supports design team on feeding forward sustainability requirements into specifications by others • Manages formal certification process (BREEAM/ Ska), collating and reviewing evidence to confirm compliance
Design and Delivery Teams	• Reviews and implements relevant requirements in the Sustainable Building Design Standard, environmental assessment (BREEAM/ Ska) and project sustainability strategy • Provides compliant evidence documents and highlights compliance risks, including alternative approaches • Identifies additional opportunities for best practice/ innovation • Organises/ attends sustainability review meetings
Energy Consultant	• Provides project-specific advice on sustainable energy solutions, with a view to minimising operational carbon emissions. • Identifies opportunities for exemplar practice/ innovation • Undertakes energy modelling as part of the project energy strategy • Carries out additional modelling (e.g. daylighting, thermal comfort) as required/appropriate • Provides energy usage data to cost consultant for LCC analysis • Inputs into MEP specifications to ensure energy efficiency is achieved in practice, highlighting any risks
Cost Consultant	• Accounts for life cycle benefits and whole life costs, budgeting and value engineering • Accounts for value of existing building materials • Where required, carry out/ input into life cycle cost and carbon analysis, presenting to EPB and the design team
Specialist disciplines	• Additional specialist inputs may be required to meet the requirements of the Sustainable Building Design Standard and sustainability assessments (e.g. access specialist, ecologist, acoustician, security consultant, transport consultant, civil/ structural engineer, heritage, commissioning manager etc.)

Key Requirements by RIBA Stage



Stage 0-1: <u>Project Brief/ Business Case</u>

Confirm sustainability opportunities and targets are included in the project brief. Identify precedent projects and review lessons learned from past experiences (as per the Soft Landings process). For refurbishment projects, include provision for building fabric upgrades in the budget.

Stage 1 Onwards: <u>Environmental Assessment</u>

Identify the correct sustainability assessment method (e.g. BREEAM, Ska) in conjunction with UoS Sustainability Strategic Plan. Complete pre-assessment(s) to embed strategies into the emerging cost plan. Agree principles for passive design, engaging with specialists where applicable.

Stage 1 Onwards: <u>Soft Landings</u>

Ensure Soft Landings guidance is fully embedded into the project to manage user consultation and inform project planning and design. This will help ensure that buildings are commissioned and managed to ensure optimum performance.

Stage 2 Onwards: <u>Life Cycle Costing</u>

All projects must demonstrate how capital expenditure is being balanced with ongoing operational and maintenance costs. Ensure that life cycle costing is not treated as a 'tick-box' exercise. Findings must have a visible impact on live design decisions and be presented/ reported as part of the project governance process.

Stage 2 Onwards: <u>Carbon Appraisal</u>

Projects which are likely to have an impact on energy consumption must calculate potential carbon and cost savings associated with different design/ specification options as part of business case development. The AUDE/EAUC Cost of Net Zero calculation tool provides a sector-specific framework, although other methodologies are available. Options to be tested must be agreed in advance as part of the project governance process with due regard to the

Sustainability Strategic Plan and in coordination with the Sustainability Implementation Group (SIG). It is important to note:

- The Sustainability Strategic Plan principle of not adding to our current emissions footprint, and;
- The requirements from SIG to identify potential impacts on Scope 1, 2 and 3 emissions outlined in the document 'Ensuring Strategic Decisions Align with Strategic Plan Sustainability Goals (see Appendix D of this standard)

Stage 2 Onwards: <u>Energy and Emissions Targets & Modelling</u>

Commission appropriate building physics modelling (energy, comfort, daylight) to guide the design towards the most sustainable outcomes. During stages 3-4, energy and emissions modelling must extend beyond regulatory minimum compliance to predict more accurate and holistic building energy use.

Stage 2 Onwards: <u>Embodied Carbon</u>

Calculate the embodied carbon impact of the project in $KgCO_2e$ per m^2 accounting for Life Stages A-C and building parts as defined within the embodied carbon section. Document design decisions undertaken to reduce embodied carbon impact.

Stages 4-5: <u>Specifications, Tender and Contract Documents</u>

Embed specific, measurable sustainability targets and requirements in tender and contract documents, that support and reference the targets of the UoS Sustainability Strategic Plan and the Environmental Management System. Ensure that the Contractor provides all necessary reassurances and operational plans (e.g. waste, site monitoring, materials sourcing, emissions reporting) to confirm that sustainability requirements will be met.

Stage 5-6: <u>Construction and handover (Soft Landings)</u>

Confirm that responsible construction practices are taking place. Ensure that stakeholders remain engaged throughout construction and handover processes to ensure a smooth transition into the building. The initial aftercare package should be planned in accordance with Soft Landings guidance.

Stage 6-7: <u>Post Project Review (Soft Landings)</u>

Ensure that lessons learned are documented following the UoS Post Project Review guidance and templates. For major projects, appoint an independent consultant to complete a post occupancy evaluation. Refer to Soft Landings guidance for requirements.

Achieving the best possible sustainability outcomes requires consideration of opportunities from inception stage onwards. For some existing buildings or acquisitions, it may not be feasible or cost-effective to bring them up to current standards.

It is essential to have a clearly defined approach to design management and environmental assessment as early as possible, and no later than Stage 1. Where relevant, building occupancy and use should be assessed at an early stage to ensure that project briefs reflect actual, rather than perceived, demand for space.

UoS and external project managers will need to ensure that all relevant requirements are accounted for, and that initial responsibilities and actions are assigned to relevant members of the project team. Depending on the project scope, this may require specialist appointments. SIG will assist with this process wherever required.

The business case for a sustainable estate

The type of environmental assessment should be confirmed in the Project Initiation Document (PID) and/or Preliminary Feasibility Report (PFR). Relevant sustainability opportunities and requirements, appropriate to the project scope, need to be reflected in business case submissions.

It is essential that life cycle value benefits are accounted for and communicated to key decision makers/budget holders, particularly when that value is accrued over a long period or where it is less tangible. This may include, for example, reduced energy consumption; lower emissions footprint; more efficient use of material and water resources; simplified maintenance; resilience or adaptability.

However, not all value benefits are immediately evident. As well as the more obvious cost savings, the business case must also account non-financial benefits such as health, productivity, accessibility, inclusion and broader community value.

A ‘whole life’ approach to planning design and planning must also include the ability for our buildings to endure and adapt to both changing user requirements and environmental change.

Actions & Responsibilities

1. **Consider whether it is possible to deliver the project sustainably**
2. **Review all relevant requirements in the Sustainable Building Design Standard**
3. **Justify any likely areas of risk/ non-conformance (where known)**
4. **Highlight opportunities for innovative or best practice sustainability interventions**
5. **Ensure initial budgets account for sustainability measures**
6. **Explore opportunities to improve access and inclusion**

Environmental Assessment (BREEAM & Ska)

Input Required: *Sustainability Consultant*
RIBA Stage: *1 onwards*

UoS is committed to the use of robust and auditable environmental assessment procedures for all of our building projects. In general, we use recognised industry standards to provide a framework for implementing environmental and broader sustainability best practice. The principal standards we use are as follows:

<table>
<tr><th></th><th>BREEAM</th><th>Ska HE</th><th>Mini-Ska/ Ska Labs</th></tr>
<tr><td>Target</td><td>Excellent[1]</td><td>Gold</td><td>Comply with all relevant measures</td></tr>
<tr><td>RIBA</td><td>New build, including extensions, and major refurbishments</td><td>Larger fit-out projects
(typically, >£5m)</td><td>Smaller projects (e.g. room/ corridor refurbishment), including lab fit-out</td></tr>
<tr><td>0</td><td colspan="3">Confirm environmental assessment method in PID/ Business Case documents</td></tr>
<tr><td>1</td><td>PRE-ASSESSMENT
Appoint BREEAM Assessor and BREEAM AP; hold pre-assessment workshop; identify early actions and responsibilities</td><td>SCOPING
Initial scoping, and pre-assessment exercise</td><td>SCOPING
UPO/PM to identify relevant measures using Mini-Ska template</td></tr>
<tr><td>2</td><td rowspan="3">DESIGN STAGE ASSESSMENT
Design team reviews; prepare evidence; include BREEAM requirements in tender docs; interim certification</td><td rowspan="3">DESIGN STAGE ASSESSMENT
Appoint assessor (if required); design team reviews; prepare evidence; include Ska in tender docs</td><td rowspan="4">SELF-ASSESSMENT
Ensure that ALL relevant measures are translated into design specification and complete Mini-Ska tool to confirm implementation</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5</td><td>CONSTRUCTION STAGE
Contractor reviews; site audits; prepare and collate project performance data</td><td>CONSTRUCTION STAGE
Contractor reviews; site audits; prepare and collate project performance data</td></tr>
<tr><td>6</td><td rowspan="2">POST-CONSTRUCTION ASSESSMENT
Finalise project performance data and provide 'as built' evidence; final certification</td><td rowspan="2">HANDOVER STAGE ASSESSMENT
Finalise project performance data and provide 'as built' evidence</td><td rowspan="2">AUDIT
Confirm final compliance
Update Mini-Ska tool
Audits carried out in line with UoS EMS</td></tr>
<tr><td>7</td></tr>
</table>

[1] Project teams for all major new build projects must demonstrate an approach to maximising the BREEAM score above the Excellent threshold, with due regard for life cycle value. A buffer of at least 5% above BREEAM Excellent must be targeted at Design Stage.

Where appropriate, proposals to achieve BREEAM 'Outstanding' are encouraged, but not at the expense of compromised life cycle value.

The choice of assessment method is not always clear-cut and should be discussed with EPB if there is any doubt. For example, UoS generally supports the use of Ska HE on major fit-out projects, but project teams may also need to consider the likelihood of any planning requirements.

Project category and hence method/rating needs to be stated in the consultants' invitation to tender.

Alternative Methods

The use of complementary and/or alternative methods may be considered where they can be demonstrated to result in an equal or improved level of performance, and subject to planning requirements. For example, major new build projects going forward may also be subject to the Passivhaus standard to provide appropriate focus on energy use intensity (EUI) targets. With an emphasis on staff and student wellbeing, we also encourage adoption of requirements from the WELL Building Standard on individual projects and may seek formal assessment in the future.

BREEAM/ Ska Assessors

The appointed assessor will be expected to facilitate BREEAM/ Ska workshops involving relevant members of the project team, and to attend regular progress update meetings. They will also be required to provide all relevant project stakeholders with guidance on the assessment in an easily accessible format, including the following as a minimum:

- Detailed list of targeted credits, including core requirements
- Different scoring scenarios. i.e.
  - to achieve targeted rating; and
  - additional credits to reach a higher score/ rating
- Areas of risk and opportunity
- Early actions required to secure time-critical credits
- Clear break-down of relevant requirements
- Confirmation of responsibilities (i.e. for compliance and evidence provision)
- Written progress updates/ reports

It is particularly important that clear responsibilities for individual requirements are defined by individual and discipline. However, all relevant members of the project team are expected to familiarise themselves with, and support implementation of, all targeted credits/ measures as required.

University/External Project Managers will need to maintain regular contact with the assessor to monitor the progress of the assessment, including risks of non-compliance or opportunities for additional credits. They should also ensure that evidence is being provided to the assessor in a timely manner.

A number of BREEAM/Ska issues require appointments and actions during the earliest stages of the project, including documented workshops/ procedures and reports from RIBA Stage 1. Depending on the project scope, this may include the following:

- Appointment of BREEAM AP (RIBA Stage 1)
- Climate change adaptation strategy (Stage 1 onwards)
- Appointment of ecologist (Stage 1 onwards)
- Materials efficiency/ circular economy workshops (Stage 1 onwards)
- Materials workshops/ life cycle analysis and carbon appraisal (Stage 2)
- Pre-demolition/ refurbishment audit (Stage 2)
- Life cycle costing (Stages 2 and 4)
- Security consultation (Stage 2)
- Passive design analysis and/or renewables feasibility (Stage 2)
- Operational energy modelling and workshop (Stage 3 onwards)
- Heritage energy study (Stage 2)
- Travel Plan (Stage 2)
- Operational energy modelling and workshop (Stage 3 onwards)

UoS prefer that assessments are managed using online tracker software (e.g. Tracker Plus or as agreed with UoS project team) in order to facilitate guidance and provide updates to the project team; set clear responsibilities and deadlines; and provide effective progress monitoring. For all assessments a live, up-to date tracking sheet must be maintained by the sustainability consultant and be available on request.

Evidence Requirements

A variety of evidence will be required to support compliance with BREEAM/Ska assessments. In many cases, it should be possible to source readily available project documentation for this purpose. However, in some circumstances it will be necessary to amend or mark-up documents, or possibly prepare additional evidence from scratch. All members of the project team are required to contribute to this process as set out in framework scopes of service, and individual disciplines are expected to have allowed for this in their fees.

Evidence must be provided so that an external assessor can be satisfied that it demonstrates unambiguous compliance against all relevant criteria. Documents must be appropriately referenced to identify, as a minimum, the purpose of the document, author, organisation and date of publication/ version.

The following table provides an indication of the types of evidence that may be required:

Design Stage	Implementation/ Post-Construction Stage
• Specifications • Tender Documentation • Annotated Design Drawings • Plans • Manufacturer's details • Formal letters (e.g. client, design team, manufacturer) • Input into reporting templates	• Site photographs • Purchase orders, invoices, delivery notes, waste transfer notes • Supplier/ product certification • Physical inspection of products on site • Waste transfer notes • Formal letters • As-built drawings

Of particular importance is the inclusion of specific sustainability requirements in tender and contract documents, both as evidence of intention to comply, and to ensure any instances of non-compliance can be dealt with effectively. Further information is provided below under 'Specifications and Tender Documents'.

Actions & Responsibilities

1. **Identify correct assessment method (e.g. BREEAM, Ska)**
2. **Appoint/ identify relevant Assessor and AP (as applicable), to guide the process**
3. **Carry out pre-assessment exercise to identify relevant measures/ credits**
4. **Commission early inputs required for compliance (e.g. reports, surveys)**
5. **Ensure that clear responsibilities have been defined by individual/ discipline**
6. **Include requirements in tender and contract documents**
7. **Identify areas of risk or opportunity**
8. **Set clear deadlines for the provision of evidence documents**

A common criticism of sustainable design initiatives is that buildings fail to perform at the levels intended during the briefing, design and construction phases. Many buildings are handed over in a state of poor operational readiness and do not achieve environmental targets or end user requirements.

The UoS approach to Soft Landings aims to bridge this "performance gap" by focussing on the following areas:

1. Effective consultation with existing/ future building users to understand how the building is likely to be used
2. Prepare realistic visualisations, mock-ups and simulation models during design stages to manage stakeholder expectations
3. Undertake walkthroughs with key personnel during construction, and plan for effective commissioning and seasonal commissioning
4. Provide appropriate training of building users and managers on how to operate the building based on design intent
5. Form an aftercare team to monitor the building in-use, and to ensure that user behaviour doesn't conflict with intended performance

It is intended that the University/ External project manager confirms the Soft Landings Champion at RIBA Stage 1 of the project.

UoS is also committed to undertaking Post Project Reviews (PPR) on all registered projects to ensure that buildings are performing as intended and to capture lessons learnt. The scope of the review will depend on project value, scope, scale and criticality. Larger/ business critical projects will require a third-party post-occupancy evaluation. This requires a functional evaluation of the building, including user surveys and technical evaluation of in-use energy and emissions performance data.

Most buildings will not reach their steady mode of operation during the defects liability period. For large and complex projects, aftercare will need to extend to at least two years post occupancy to ensure energy and environmental performance objectives are met. The University project manager will be responsible for organising necessary remedial work.

Actions & Responsibilities

1. **Commence Soft Landings from RIBA Stage 1 and ensure the process is effectively managed throughout the project lifecycle**
2. **Use Soft Landings guidance to ensure close, early collaboration between members of the project team, building occupants and building managers**
3. **Pin down an effective handover process including best practice commissioning, seasonal commissioning and post-occupancy evaluation**

Life Cycle Costing (LCC)

Input Required: Cost Consultant
RIBA Stages: 2 and 4

UoS recognises that investing in efficiency measures, including robust and durable building fabric and services, can result in lower operating costs and life cycle savings. We therefore require all our projects to look beyond the initial capital costs, through to operation, maintenance, refurbishment and decommissioning.

Methodology

- For major projects (typically >£10m), a formal life cycle costing (LCC) analysis must be carried out. This must be in line with 'Standardised method of life cycle costing for construction procurement' PD 156865:2008 and carried out at elemental level (Stage 2) and component level (Stage 4).
- Project teams must be able to demonstrate, with evidence, how the LCC analysis has been used to influence building and systems design/specification to minimise life cycle costs and maximise critical value.
- Smaller projects (<£10m) are not required to carry out full LCC analysis. However, calculations must be carried out to determine potential life cycle savings and to justify investment in more efficient solutions.
- For maintenance, minor works and smaller refurbishment projects the calculation of simple financial payback and net present value associated with different options, is likely to be sufficient.

In addition to purely financial considerations, the life cycle costing process should also account for the value associated with social and environmental impacts/ benefits as far as possible (e.g. carbon emissions; biodiversity net gain of 10%; health and wellbeing), and the future cost of offsetting any retained or additional carbon emissions.

At all stages, the cost consultant and design team must work collaboratively to demonstrate how the LCC appraisal has been used to influence building and systems design/ specification to minimise life cycle costs and maximise critical value. Any value engineering decisions impacting on building/ energy performance must be discussed collaboratively and undergo a formal sign-off process as part of the project governance process, and in conjunction with both EPB and SIG/SSB.

LCC results must be included in the relevant stage gate review documentation to aid informed decision-making about the balance between capital and operational costs. This should include consideration of best practice or innovative solutions that can provide long-term value.

Actions & Responsibilities

1. **All projects must demonstrate sound financial sense throughout their projected lifecycle – capex and opex must always be considered together (i.e. 'totex')**
2. **Major projects require formal lifecycle costing starting at RIBA Stage 2**
3. **Facilitate the provision of energy and cost information to support the process**
4. **Account for non-financial benefits, particularly relating to health & wellbeing**
5. **Findings from lifecycle cost studies must be presented to EPB with a visible impact on live design decisions**
6. **Value engineering decisions impacting negatively on building/ energy performance or life cycle costs, must be clearly documented and agreed with EPB/SIG/SSB**

Carbon Appraisal

Input Required: Energy Consultant
RIBA Stages: 2-3

UoS has an obligation to measure, monitor, report and reduce carbon emissions associated with its estate and operations. Our Sustainability Strategic Plan targets net zero for Scope 1 and 2 emissions by 2030. As such, all projects which have an impact on building energy consumption (i.e. including provision or changes to building fabric or fixed services) should account for any increase or decrease in operational carbon emissions, as well as operational cost implications.

The principal aims of the carbon appraisal are as follows:

- Part of feasibility assessment - to inform business case decision making
- To evaluate different building servicing/ fabric options during early design stages
- To identify the option with lowest life cycle carbon and associated costs
- Provide accurate and auditable emissions data to assist with UoS reporting

The level of detail required will be dependent on project scope and determined in conjunction with EPB.

For simple projects, or where a specialist energy consultant has not yet been appointed, an initial carbon appraisal should be undertaken. For larger, more complex projects, the appraisal will be informed by more detailed operational energy and emissions modelling.

In all cases, the difference between the baseline option and chosen option(s) must be calculated so that carbon savings and financial payback of energy saving measures can be reported.

Actions & Responsibilities

1. **During RIBA Stage 1, agree the expectations for Carbon Appraisal across the project with EPB**
2. **Carry out a carbon appraisal on all projects at RIBA Stage 2 which have an impact on building energy consumption, appropriate to the project scope and likely emissions**
3. **Facilitate the provision of relevant performance data for different scenarios**
4. **Identify the option with lowest life cycle carbon and associated costs**
5. **Provide accurate and auditable emissions data to assist with UoS reporting**
6. **Where appropriate, input operational energy predictions at RIBA Stages 3-4 into the carbon appraisal (can be calculated separately) to enable the total energy use, carbon and cost to be forecasted**

Energy Targets & Modelling

Input Required: *Energy Consultant*
RIBA Stages: *2 onwards*

UoS is committed to ensuring our buildings achieve net zero carbon in construction and operation, as defined by the UKGBC Framework Definition. This requires a greater emphasis on operational energy modelling, embodied carbon calculations and energy demand reduction as the primary approach. Carbon offsetting and/ or green tariffs should be avoided in building energy strategies as far as possible.

All major projects, new build and refurbishment (>£10m), must present proposals to minimise energy use intensity (EUI) and operational emissions intensity in relation to UoS Sustainability Strategic Plan targets and best practice industry targets.

1. Develop a building energy strategy, including energy use intensity (EUI) targets, from RIBA Stage 1 onwards, prioritising energy demand reduction over low carbon supply

This should follow a 'passive first' approach and reflect building type; function; users and usage patterns; equipment requirements etc. (Passivhaus principles should be followed where appropriate).

2. Confirm proportionate[2] EUI targets no later than RIBA Stage 3.
3. Undertake and maintain operational energy modelling from RIBA Stage 3 to confirm or refine the EUI target.

Use CIBSE TM54, advanced HVAC simulation, and/or the Passive House Planning Package, as appropriate. The model will need to be maintained throughout RIBA Stage 5 & 6 to represent the 'as-constructed' building, accounting for any value engineering that may impact performance.

In addition, the following is required on all relevant projects:

4. UoS Soft Landings Guidance (RIBA Stages 1 – 7; projects >£2m) requires a technical reality check no later than RIBA Stage 4 which should be used to de-risk any energy performance gap.

Independent design review may also be appropriate for major projects.

5. The Contractor will work with the design team to deliver against the operational energy performance targets, highlighting any additional risks or opportunities.

This includes commissioning, seasonal commissioning and fine-tuning the operation of the building during the first 12 months after practical completion.

[2] With reference to the following benchmarks:
a) New buildings: Total Energy Use Intensity (EUI) of ≤ 65 kWh/m2/yr GIA (teaching) or ≤ 55 kWh/m2/yr (GIA (offices); Space heating demand should be ≤ 15 kWh/m2/yr (GIA)
b) New buildings (specialist functions) & major refurbishment of existing buildings: 75% reduction in operational energy use per m^2 as compared to CIBSE TM46 benchmarks ('Typical' benchmarks, area weighted by function)

Relationship with statutory requirements

Energy calculations for regulatory compliance (Building Regulations Part L) are often misinterpreted as predictions of in-use energy consumption. However, they do not account for all energy uses in buildings, nor do they consider realistic occupancy profiles or realistic plant operating parameters.

Because of this, Part L calculations cannot be used as a basis for estimating in-use utilities costs. Similarly, Part L cannot be used as the approach for ensuring operational energy performance is as low as it can be.

UoS requires that all major new build/ part new build projects meet or improve on regulated carbon and sustainability targets set out by Southampton City Council, and Winchester City/Hampshire County Council for relevant projects. In addition to the standard building regulations requirements for major refurbishments, heritage buildings should also target or improve on Part L2B standards as far as reasonably practical.

Choice of modelling approach

The selected modelling approach, or combination of approaches, shall be agreed with the University/external project manager on commencement of the project, in consultation with the Programme Co-ordination Board and EPB. The table below provides guidance on applicable routes.

Modelling approach	**Project scope**
CIBSE TM54	Naturally ventilated buildings (i.e. lower complexity)
HVAC simulation (extension of TM54)	Mechanically ventilated buildings (i.e. greater complexity)
PHPP	Deep building fabric and/or air tightness works

Calculations must account for **all main building loads**, over and above basic regulatory compliance. As a minimum, this must include those in CIBSE Guide A (2015) Table 5.22:

CIBSE Guide A (2015) Table 5.22 – Main sources of building energy demand

Current 'regulated' energy total demands in England & Wales	Additional demands contributing to building loads
Heating Cooling Fans, pumps and controls Fixed lighting Domestic hot water	Small power Catering Business/ process loads External lighting Lifts/ escalators

Unregulated sources of energy consumption, including specialist functions, must also be considered at the design stage (these typically account for more than 30% of the energy consumption in standard office-type buildings). This includes specialist/lab equipment and servers, whereby the design strategy must also consider how to reduce these loads.

Under no circumstances is it acceptable for ‘operational energy modelling’ to be Part L modelling plus NCM unregulated loads.

Uncertainty should be reflected by providing a ‘results envelope’. For example, alternative realistic occupancy levels/patterns may be included, as appropriate. Results should then be presented as a range (i.e., ‘absolute energy demand between x and y kWh/year’). This should include the annual heating and cooling generation efficiency to demonstrate that the proposed heating and cooling systems operate efficiently for all scenarios.

In addition to energy modelling (operational and Part L compliance) UoS require that thermal comfort assessments are undertaken, in line with the appropriate BREEAM standard for the project. This shall include ‘future climate’ thermal comfort modelling, using weather files as defined in BREEAM for naturally ventilated and mechanically ventilated buildings, as appropriate.

All buildings should balance energy, daylight, and overheating. Energy performance should not create an adverse overheating risk.

Target design parameters

Where appropriate, the following design parameters shall form the basis of design:

Building Fabric	Performance requirement (U-value)
Walls	0.12 – 0.15 $W/m^2.K$
Floor	0.10 – 0.12 $W/m^2.K$
Roof	0.10 – 0.12 $W/m^2.K$
Windows	1.0 $W/m^2.K$ (triple glazing) 1.2 $W/m^2.K$ (double glazing)
Doors	1.2 $W/m^2.K$
Air tightness	≤1 $m^3/h.m^2$ @ 50 Pa (projects above £10m) ≤3 $m^3/h.m^2$ @ 50 Pa (all other new build projects) ≤5 $m^3/h.m^2$ @ 50 Pa (all other refurbishment projects) ≤10 $m^3/h.m^2$ @ 50 Pa (where appropriate for heritage projects*, or projects with limited alterations to the façade) *Heritage projects should employ best practice measures to reasonably limit air leakage pathways whilst avoiding any adverse impact on building fabric (e.g. condensation issues)
Thermal bridging	0.04 (y-value)
G-value of glass	Typically, 0.4 – 0.3, but requires consideration of glass area, orientation and room use to balance daylight and solar gain.

MEP item	Performance requirement
MVHR	90% (efficiency)
Heat pumps and chillers	Best practice SCoPs and SEERs dependant on system type. Include calculation of delivered heat and cooling efficiency including all ancillary devices (e.g. supplementary heating), based on BS EN 14825:2016.
Central AHU SFP	1.5 – 1.2 W/l.s
A/C set points	20-26˚C

In addition, the following principles shall be applied where appropriate:

- Heat emitters shall be designed to operate with very low temperature hot water, e.g. 45˚C and below:
  - Sizing of heat emitters/ space limitations will need to be taken into account. Consider underfloor/radiant systems where feasible.
  - Provide domestic hot water generation solutions which are complimentary and do not cause increase in flow temperature of all systems.
- Connect to a low temperature heat network, or provide heating and hot water solutions that are fossil fuel free:
  - For example, generation of heat should be from electric heat pump systems, or via connection to a district heat network that is or will be decarbonised.
  - Where a building is connected to the existing UoS District Heating network, ensure that the design enables a future reduction in temperature
- Demonstrate how on-site renewable energy is being maximised. For example, target an annual energy requirement for at least two floors of the development being met through renewable energy, confirmed through the energy model. Feasibility studies are expected to incorporate target efficiency values with comparison/ reference to other recent UoS projects.
- Demonstrate how demand response is being maximised, i.e. measures to reduce peak heating and hot water peak demand. For example, appropriately sizing heating/hot water buffer vessels for peak demand; lighting load shedding flexibility; provide active demand control and battery storage.
- Demonstrate how secondary waste heat is being maximised, i.e. incorporate systems to reuse waste heat for building heating and domestic hot water generation, where feasible (for example IT cooling systems, ventilation exhaust, heat recovery chillers, catering refrigeration).
- Passive design measures such as external shading[3], exposed thermal mass, low glazing ratios (i.e. 25-40%), openable windows and cross ventilation, should be included before the adoption of renewable energy solutions.

[3] Internal blinds are often installed to help reduce solar gain although benefits are limited. External shading & higher performance g-value glazing should be encouraged where feasible.

Heritage Considerations

UoS is committed to energy efficient, sustainable solutions that are also sympathetic to the heritage status of our buildings.

We recognise that the Planning (Listed Buildings and Conservation Areas) Act 1990 will need to be taken into account in relation to some improvements to building fabric/ thermal performance in particular. Work should not prejudice the character or cultural significance of the building or increase the risk of long-term deterioration to the fabric or fittings.

However, we are also clear that all feasible efficiency improvements must be properly explored in order to contribute to our institutional carbon reduction targets; and in accordance with the net zero carbon framework set out by the UKGBC.

Relevant projects must involve early engagement between the design team; experts in sustainable heritage; and the local planning authority. Opportunities to improve the building fabric in agreement with heritage are strongly supported by EPB.

The University/External project manager and cost consultant shall consult with EPB and/or independent MEP consultant (and heritage consultant where applicable) to highlight opportunities for holistic building envelope and services upgrades on major refurbishment projects. This is expected from the early feasibility stage onwards, with options for reasonable improvements included within the business case, and Stage Gate documentation.

Example measures which may be applicable include roof insulation; floor insulation; internal wall insulation; new/upgraded controlled fittings (windows/doors/secondary glazing) in line with the existing character of the building; and draught proofing to all air leakage paths.

Further guidance on how to optimise sustainability for heritage projects is available from the following sources:

- Historic England (2018) *Energy Efficiency and Historic Buildings* English Heritage
- Balson, K., Summerson, G., and Thorne, A. (2014) *Sustainable Refurbishment of Heritage Buildings* BREEAM

Actions & Responsibilities 1. **Undertake operational energy modelling on all major new build / part new-build and refurbishment projects** 2. **Feasibility studies to assess viable targets shall be undertaken at RIBA Stage 2, with whole building operational modelling at RIBA Stages 3&4** 3. **Any deviations to operational energy targets are to be agreed with EPB/SSB/SIG no later than RIBA Stage 3** 4. **The operational building simulation model (e.g. IES) shall be maintained throughout RIBA Stage 5 & 6 to represent the ‘as-constructed’ building, accounting for the impacts of value engineering exercises** 5. **The Contractor will work with the design team to deliver against the operational energy performance targets, highlighting any additional risks or opportunities** 6. **For heritage buildings, engage early on appropriate/ sympathetic improvements, including expert advice from the early feasibility stage**

UoS is committed to the measurement, disclosure and reduction of embodied carbon throughout the life cycle of projects. This includes emissions associated with materials extraction; processing; manufacture; distribution and assembly. It also includes the implications of maintenance, repair, replacement, demolition and disposal.

New Build Projects

UoS expects that major new build/ part new build projects target embodied carbon reductions of 40% and/or to <500 $kgCO_2/m^2$ for superstructure and substructure.

RICS provides a standard approach to life cycle assessment (LCA) of materials in their Whole Life Carbon Assessment methodology. Major new build/ part new build projects (>£10m) are expected to cover the following:

- Building parts:
  - Substructure 1.1 & External works 8.2
  - Superstructure 2.1-2.7
- Life stages:
  - Product stage [A1 – A3]
  - Construction stage [A4 – A5]
  - Replacement & refurbishment stage [B4-B5]
  - End of Life [C1-C4]

BREEAM 2018 Mat 01 Life Cycle assessment of materials also requires this exercise to be undertaken for compliance.

Refurbishment Projects

For major refurbishment projects, the building parts within the scope of works to be assessed may be limited. Where the scope of works includes elements of the building parts above, they should be assessed however on top of this the following building elements should be assessed:

- Building parts:
  - Finishes 3.1-3.3
  - Building Services 5.1-5.4 Building-related
- Life stages:
  - Product stage [A1 – A3]
  - Construction stage [A4 – A5]
  - Replacement & refurbishment stage [B4-B5]
  - End of Life [C1-C4]

For major refurbishment finishes and MEP services embodied carbon must be assessed and reductions made where possible as the RIBA stages progress.

Data sources used in the LCA shall be stated. The following industry databases are acceptable sources of carbon data for materials and products:

- The Inventory of Carbon and Energy (ICE) database;
- Environmental Product Declarations (EPDs) and datasets in accordance with ISO 14025, ISO 14040 and 14044; and
- IMPACT compliant software packages such as One Click LCA, eTool etc.

The LCA consultant should undertake embodied carbon analysis at RIBA Stages 2 and 4, as a minimum to align with BREEAM reporting. During RIBA Stage 3 the LCA consultant should document what recommendations are (or are not) being implemented by the design team to reduce embodied carbon. All assumptions must be clearly stated.

The LCA assessment should be presented in the following way:

- Total $kgCO_2e$, or any clearly stated metric multiples thereof as appropriate, e.g. tCO_2e;
- Total $kgCO_2e$ per building element i.e. substructure, superstructure etc and each expressed as a percentage of the total footprint;
- Total $kgCO_2e$ per major building component i.e. walls, floors etc and each expressed as a percentage of the total footprint; and
- Total $kgCO_2e$ per m^2 [based on Gross Internal floor Area (GIA)]

Smaller Projects

For smaller projects that include new superstructure and substructure, a 40% reduction in embodied carbon should be targeted in order to drive higher recycled content, cement replacements and material efficient design. Calculations should be based on material volumes from the cost plan and ‘business as usual’ carbon factors for standard materials (e.g. cement mix with no cement replacement) vs. the proposed improvement approach.

Circular Economy Statement

Major projects must provide a circular economy statement considering whole life embodied carbon of materials, including end of life re-use opportunities. Standard contents for the circular economy statement, together with relevant BREEAM/ Ska issues, are set out below.

Circular economy principles	BREEAM	SKA
Re-use (including refurbish and repurpose) i) Re-use the existing asset ii) Recover materials and products iii) Share materials and products for reuse	Mat 06 Wst 01	SKA Waste & Materials categories
Design buildings for optimisation i) Design for longevity ii) Design for flexibility iii) Design for adaptability iv) Design for assembly, disassembly and recoverability	Mat 05 Mat 06 Wst 05 Wst 06	
Standardisation or modularisation	Mat 06	
Servitisation and leasing	Man 02	
Design and construct responsibly i) Use low impact new materials ii) Use recycled content or secondary material iii) Design out waste iv) Reduce construction impacts	Mat 01 Mat 02 Mat 06 Wst 02 Wst 01	

Further guidance on embodied carbon is available from the following sources:

- RICS (Nov 2017) *Whole Life Carbon Assessment for the Built Environment*
- RIBA Architecture (December 2019) *2030 Climate Challenge*, *RIBA Sustainable outcomes Guide*
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Actions & Responsibilities

1. **Undertake LCA on all major new build / part new-build and refurbishment projects**
2. **LCA analysis should be undertaken at Stage 2 to estimate the embodied carbon of the project and identify the impact of potential savings.**
3. **Document decisions taken to reduce embodied impact at Stage 3 and update the LCA calculation at Stage 4 to calculate the embodied carbon of the project.**
4. **Tender documentation to include the LCA requirements for materials sourcing and monitoring carbon reductions during construction.**
5. **Suppliers to be assessed for their ability to provide relevant information.**

Specifications, Tender and Contract Documents

Input Required: UoS PM/External PM
RIBA Stages: 3-4

The UoS Sustainable Building Design Standard forms contract documentation for all projects. In addition, it is important that project teams embed relevant requirements from this standard and BREEAM/ Ska assessments within project documentation to ensure that all targeted measures are incorporated and not overlooked.

This requires the review and/ or provision of appropriate input to specification, tender and contract documents. Where appointed, this should be supported by the sustainability consultant.

Sustainability experience and expertise must also be included as part of design team and contractor evaluation. Ensuring that we have specialists with relevant experience – and commitment – to achieving sustainable project outcomes means that we are also more likely to manage costs and optimise value.

The following key documentation should reflect project sustainability requirements:

- Business case/ PSO Stage Gates/ monthly reports
- End of stage reports
- Specification documents (particularly architectural and MEP)
- Tender documents: PQQ/ ITT, prelims, employer's information requirements
- Access tracker
- Pre-construction information
- Additional contract documents

For BREEAM or Ska assessments, the required rating, and input into the formal assessment process must be a contractual requirement. Specifications and tender documents may need to be supplemented with additional evidence materials prepared by individual disciplines. This includes letters, reports, design plans, drawings, manufacturers' details, technical calculations and models etc.

Value Engineering (VE)

It is particularly important to account for implications of any value engineering exercises which may impact on sustainability performance, including BREEAM/ Ska compliance, energy strategy or life cycle value. Our priority is to differentiate between value engineering and cost-cutting – avoiding the latter – ensuring that long-term operation and maintenance costs are fully understood and accounted for.

Relevant reports may need to be revised as part of the VE process (e.g. energy model, life cycle costing, carbon appraisal).

The sustainability consultant and/ or SIG/SSB must be included as part of this process to agree any VE-related changes which may impact on sustainability performance, including unintended consequences and life cycle costs.

Actions & Responsibilities

1. **Account for sustainability expertise in design team and contractor evaluation**
2. **Ensure all members of the team are aware of the requirement to comply with the UoS Sustainable Building Design Guide**
3. **Ensure consultants account for specific, detailed requirements in design documentation**
4. **Include sustainability targets and requirements in contract documents**
5. **Ensure that value-engineering accounts for life cycle value, and is not simply a cost cutting exercise**