Department for Education

Further Education Output Specification

Technical Annex 2J: Sustainability

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Document Control

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Contents

Summary

Technical Annex 2J provides the minimum requirements for sustainability. It responds to the demands of Climate Change and aims to mitigate the effects and recognise adaptations required in educational establishments for a changing environment. This document focuses on the path to reduce carbon emissions within the DfE estate to zero. It is to be read in conjunction with the Generic Design Brief (GDB) and the College-specific Brief (CSB).

Review Date

Review dates for this document shall be at 6-month intervals.

Who is this publication for?

This document is for technical professionals involved in the design and construction of college premises, as part of the Employer's Requirements of the DfE Construction Frameworks (the DfE Construction Framework 2021 and the Offsite Schools Framework (incorporating Modular and MMC delivery) (MMC)). It may also be used as the basis of similar documentation for other procurement routes using the Further Education Output Specification.

Uniclass Codes

This document captures Uniclass codes for the management of exchange of information. To access all codes and associated titles reference should be made to Uniclass 2015 | NBS (thenbs.com).

1. Introduction

1.1 Overview

1.1.1 This document is one of the Further Education Output Specification (FE-OS) Technical Annexes that forms part of the Generic Design Brief (GDB). [PM_10_20]

1.1.2 The definitions listed in the GDB shall apply to this Technical Annex and all other parts of the FE-OS. [PM_10_20]

1.1.3 This document shall be read in conjunction with the GDB and all other Technical Annexes as well as the College-specific Brief (CSB), including the College-specific Annexes. [PM_10_20]

1.1.4 This document sets out the required technical standards and performance criteria for sustainability. [PM_10_20]

1.1.5 The information exchange required at each stage of the design, build and completion process is detailed in the DfE's Exchange Information Requirements (EIR). [PM_10_20_28]

1.1.6 The requirements in this Technical Annex shall apply to all parts of the works; New or Refurbished. [PM_10_20]

2. General Requirements

2.1.1 In line with the government legislation, the DfE is committed to:

a) responding to Climate Change through mitigation and adaptation [PM_40_20_85]

b) reducing carbon emissions to zero across our estate by 2050. [PM_40_20_85]

2.1.2 This document sets a sustainable approach to the design, construction, production and operation of educational buildings and grounds which:

a) put the long-term needs of the building users (all students, staff and building users) at the centre of all decisions [PM_10_20_82]

b) are future proofed against the risks of climate change as defined by UK adaptation policy i.e., higher temperatures and prolonged rainfall [PM_35_40_84]

c) create a healthy and productive whole site setting, in response to UK's 25-year Environment Plan including biodiversity net-gain [PM_35_40_84]

d) prioritise the application of low energy, fossil fuel free buildings which respond to climate resilience including 'Net Zero carbon ready' recognising a development of targets to 'zero' over a timeline up to 2050 [PM_35_40_84]

e) calculate and report on Embodied Carbon in Construction, at key stages as defined by the standards within the Net Zero Carbon Buildings: A Framework Definition UK Green Building Council (UK GBC) Using EN15978. [PM_35_40_84]

2.1.3 In respect of refurbished works, the required level of compliance with this Technical Annex is set out in the Refurbishment Scope of Works (RSoW). [PM_10_20]

2.1.4 Design development shall clearly evidence the analysis of differing site contexts, future weather patterns across the differing climate scenarios and be tested with consideration of the whole life impact. An options appraisal shall be undertaken using best practice industry standard metrics. [PM_10_20_82]

2.1.5 The benefits and impact of the options are to be transparently reported to enable the Employer to make informed decisions. [PM_10_20_82]

3. Sustainability measures

3.1 User-centred college design

3.1.1 The Educational buildings and grounds shall:

a) be arranged on the Site prioritising functions for students use across the Educational day [PM_40_20_85]

b) adopt appropriate adjacencies for ease of movement and efficient operation of the College [PM_40_20_85]

c) prioritise the students' needs and educational requirements and in addition respond to the needs of other building users [PM_40_20_85]

d) be adaptable to changes in purpose and function to support the educational organisation to develop over the whole life of the Building and its grounds. [PM_40_20_85]

3.1.2 Students shall have free-flow movement to ease wayfinding around the Site. Consideration shall be given to:

a) arrival and departure sequences to support active travel with generous thresholds at the site boundary [PM_40_20_85]

b) the approach towards and around the buildings and the Secure Line [PM_40_20_85]

c) movement in and out of the Building(s). [PM_40_20_85]

3.1.3 The benefits for all building users, of current and future generations, is an integral part of the development of the Project and captured within the College-specific Brief (CSB), with particular reference to the Sustainable Estate Strategy. [PM_40_20_85]

3.1.4 The Contractor shall ensure that the College's operational costs (energy and maintenance costs) are not adversely affected by the selection of low carbon plant and equipment. [PM_10_20_82]

3.2 A healthy and productive site

3.2.1 Site specific constraints and opportunities may drive alternative solutions. These shall be transparently presented to and agreed with the Employer. Approved alternative solutions should be captured in the College-specific Brief (CSB). [PM_40_20_85]

3.2.1 Site Layout

3.2.1.1 The Educational buildings and grounds shall:

a) create a healthy and productive place, where the health of the students and measures for development are prioritised, within a context of planetary health [PM_35_05_79]

b) be designed for current and future generations, including adaptation measures in response to the impacts of climate change [PM_35_05_79]

c) be considered holistically, to create a quality sense of place, with the priority of uses for the students [PM_35_05_79]

d) be welcoming, with appropriate places for all building users. [PM_35_05_79]

3.2.1.2 The Site shall be developed to prioritise the quality of outdoor space for community and educational use. Refer to Technical Annex 2B for further detail. [PM_10_20_90]

3.2.1.3 Arrival and departure sequences shall be considered in the following context.

a) Priority given to healthy and active travel including walking and cycling. [PM_35_05_79]

b) Desire lines for pedestrian movement shall inform layout. [PM_35_05_79]

c) Location of cycle shelter to be passively supervised. [PM_35_05_79]

d) Where vehicle parking is required, it shall not dominate the arrival and entrance sequence to the site. [PM_10_80_80]

e) If drop-off is required it shall be appropriately placed. [PM_35_05_79]

f) Disabled parking shall be located to comply with AD M. [PM_35_05_79]

g) Third party access for deliveries and maintenance shall be discreet. [PM_35_05_79]

3.2.2 Flood Risk

3.2.2.1 The risk of flooding to the Building and grounds shall be assessed, options analysed and mitigation measures considered to inform the final solutions. [PM_30_30_29]

3.2.2.2 Flooding in the following context shall be considered:

a) Sea and river flooding (pluvial flood) due to rising water levels. [PM_30_30_29]

b) Surface water on-off flooding (fluvial flood). Intensity of falling rain and inability for hard surfaces i.e., roofs, ground etc. to slow the flow of falling water from entering the drainage system causing surface water flooding. [PM_30_30_29]

3.2.2.3 To inform the scale of capital investment appropriate for the Site, the Contractor shall:

a) identify the flood risk assessment profile for the Site [PM_30_30_29]

b) act based on the flood risk assessment profile:

i) No Risk: No further action. [PM_30_30_29]
ii) Any Risk: Carry out full flood risk assessment. [PM_30_30_29]

3.2.2.4 Appropriate solutions shall be developed relative to the outcome of the flood risk assessment. [PM_30_30_29]

3.2.3 Sustainable Drainage Strategy

3.2.3.1 A whole site Sustainable Urban Drainage Strategy (SuDS) shall be developed including measures to slow down water run-off by implementing site specific solutions such as:

a) ground level vegetation [En_32_35_80]

b) reduction in hard non-permeable surfaces including paths, vehicles, sports, [Ss_50_70_85]

c) green roof systems as detailed in Technical Annex 2C [Ss_45_40_47_28]

d) controlled rainwater run-off from adjacent hard surfaces by the incorporation of or as shallow, broad, vegetated swales to mimic natural drainage. [Ss_50_70_85_85]

3.2.3.2 Swales shall take precedence over the implementation of fenced attenuation tanks/ponds. [PM_10_20_82]

3.2.4 Green Infrastructure

3.2.4.1 Greening measures, to provide green cover, shall be integral to the master planning of the Site, working together with the placing of New Building(s) and external space requirements. [PM_35_05_79]

3.2.4.2 Sites shall demonstrate an increase in the level of greening across the Site to achieve a biodiversity net gain.

a) The Urban Greening Factor (UGF) should be used in preliminary stages to determine the amount of green cover across a site. [PM_40_30_20]

b) Every site shall achieve a minimum Urban Greening Factor of 0.35. [PM_40_30_20]

c) The Ecological Constraints and Opportunities Survey shall be used to report the level of greening across the Site for more rural application where the UGF may not apply. [PM_30_30_25]

3.2.4.3 Across all sites, free cooling benefits shall be recognised through use of vegetation to protect comfort levels inside the Building, particularly on the top floor including:

a) microclimate created by shading of trees [Pr_45_30_90]

b) planted structures [PM_10_20_80]

c) green roofs [Ss_45_40_47_28]

3.2.4.4 Trees shall be an integral part in the planning and layout of the new building and grounds and shall:

a) be planted as part of the quality of place, to be in scale with the adjacent buildings [Pr_45_30_90]

b) be placed in relationship to the Building and enhance the connectivity to nature from within the Building, as an essential part of the character of the place [Pr_45_30_90]

c) be viewed from communal space, such as from a window in circulation or stair landing, or from a place of assembly or route out, placed to the side of Desire Lines [Pr_45_30_90]

d) provide localised shaded climates within external landscape [Pr_45_30_90]

e) be placed to provide free cooling, to benefit the users in the Building. [Pr_45_30_90]

3.3 Resilient Educational Buildings

3.3.1 Context

3.3.1.1 The Intergovernmental Panel on Climate Change (IPCC) has recommended urgent action to limit global warming to below 2°C above pre-industrial levels to mitigate the worst potential impacts of climate change. [PM_35_05]

a) International commitments to pursue efforts to limit warming to 1.5°C were secured by the Paris Agreement in 2016. However, as noted in the UK Climate Change Risk Assessment (CCRA) 2017, this shall require more significant progress to be made. [PM_35_05]

b) The CCRA therefore assessed impacts for a 2°C and 4°C rise in global mean surface temperatures (GMST) above pre-industrial levels. The findings of the CCRA inform policy for climate change adaptation in the UK under the National Adaptation Programme (NAP). [PM_35_05]

3.3.2 New Buildings

3.3.2.1 New Buildings shall be future proofed to avoid the risk of overheating by testing the Building design in accordance with the performance standard defined within Technical Annex 2F.

a) Designs shall demonstrate compliance with a 2°C global warming scenario weather file, represented by CIBSE DSY1 50th Percentile Low emission 2080. The most appropriate location of the College building shall be used for the summertime thermal comfort assessment. This does not necessarily mean the nearest location and the file should reflect the most comparable climatic characteristics. [PM_35_10_60]

b) Designs shall demonstrate that they are able to adapt to overcome overheating when assessed against a 4°C global warming scenario weather file, represented by CIBSE DSY1 50th Percentile High emission 2080, without needing changes to the superstructure and in line with the cooling hierarchy in Section 8.1 of Technical Annex 2F. [PM_35_10_60]

3.3.3 Existing Buildings

3.3.3.1 Intervention in an Existing Building should be relative to the extent of works described within the Project Brief. [PM_10_20_82]

3.3.3.2 All Existing Buildings on site shall also be future proofed to avoid the risk of overheating by testing the building design with the Overheating Risk Assessment Criteria and weather patterns, as defined within Building Bulletin 101 2018.

a) Existing Buildings shall demonstrate compliance with the current Overheating Risk Assessment (ORA) as established in BB101, using a 2020 DSY weather file most appropriate for that location. [PM_35_10_60]

b) Designs shall demonstrate that they are able to adapt to overcome overheating when assessed against a 2°C global warming scenario weather file, represented by CIBSE DSY1 50th Percentile Low emission 2080. [PM_35_10_60]

3.3.3.3 Proposed adaptation measures shall form part of the response to CS6: College-specific Sustainable Estate Strategy and shall be assessed in conjunction with the Project Brief. Adaptation measures should not involve significant changes to the structural configuration of the Building and shall follow the energy hierarchy in the GDB and cooling hierarchy in Section 8.1 of Technical Annex 2F. [PM_10_20_90]

3.3.4 Passive Design Strategy

3.3.4.1 The design shall test and demonstrate passive design measures, which are the least complex and most cost-effective whole-life measures as part of the climate resilient and net zero strategy. These measures are set out within Technical Annex 2H. [PM_40_20_85]

3.3.5 Future proofing

3.3.5.1 Matters associated with future proofing form part of the Strategic Brief and shall be clearly reported within the resultant CS6: College-specific Sustainable Estate Strategy. [PM_10_20_90]

3.4 Materials and Construction

3.4.1 The approach to materials and construction requires long-term whole-life cycle assessment to achieve performance. Current DfE standards are defined within:

a) Technical Annex 2B: External Spaces and Grounds. [PM_10_20_90]

b) Technical Annex 2C: External Fabric. [PM_10_20_90]

c) Technical Annex 2D: Internal Elements and Finishes. [PM_10_20_90]

3.5 Energy and Net Zero Carbon

3.5.1 General Requirements

3.5.1.1 New Buildings shall reduce their impact as part of built environment measures to limit warming to 1.5°C as secured by the Paris Agreement 2016. [PM_40_20_85]

3.5.2 New Buildings

3.5.2.1 New Buildings shall be designed to the Fabric First principle. [PM_40_20]

3.5.2.2 The requirements associated with External Fabric are defined within Technical Annex 2C. [PM_10_20_90]

3.5.2.3 The Contractor shall design and construct the new facilities to meet the Energy Use Intensity (EUI) Targets defined in Technical Annex 2H, based on CIBSE TM54 assessment. [PM_10_20_90]

3.5.2.4 The Energy Use Intensity (EUI) values shall be achieved before the application of renewable technology. [PM_35_70]

3.5.2.5 The Contractor shall provide roof coverage of Photovoltaic (PV) panels. The standards for PV installations are defined within Technical Annex 2G. [PM_10_20_90]

3.6 Carbon Targets & Reporting

3.6.1 Operational Carbon

3.6.1.1 All New Buildings shall achieve Net Zero Carbon in Operation, as defined by the standards within the Net Zero Carbon Buildings: A Framework Definition UK Green Building Council (UK GBC) Using EN15978. Recognising a development of targets over a timeline.

a) Net Zero Carbon - Operational (now) [PM_40_20]
   The design of New Buildings shall be net zero carbon for operational energy B6 (1.2) achieved annually, in-use.

b) Design to be developed to cover stages B1 - B7. [PM_40_20]

3.6.1.2 Net Zero Carbon in Operation shall be calculated to include regulated and unregulated energy use, following the CIBSE TM54 methodology, projected against 2050 BEIS figures for grid decarbonisation. [PM_30_30_10]

3.6.1.3 Off-site off setting is not permitted. [PM_10_20_82]

3.6.1.4 Where a college site meets all of the requirements of the Further Education Output Specification, but site-specific items or project constraints mean that it is not possible to achieve Net Zero Carbon in Operation using on-site renewables, a clear roadmap towards 2050 should be provided to the Responsible Body as part of the Strategic Brief output in Annex CS6. [PM_10_20_90]

3.6.1.5 Zero Carbon in operation reporting shall be part of the development of the Project at each stage of the RIBA Plan of Works 2020, for the whole life of the Project. [PM_10_20_82]

3.6.2 Embodied Carbon

3.6.2.1 For New Buildings the Contractor shall report on Embodied Carbon in Construction using EN15978. [PM_10_20_90]

3.6.2.2 The design shall be tested to cover stages A1 to A5 as defined by the standards within the Net Zero Carbon Buildings: A Framework Definition UK Green Building Council (UK GBC). [PM_10_20_90]

3.6.2.3 There is no requirement for projects to achieve a set standard for embodied carbon, but embodied carbon reporting forms part of the DfE's EIR and is required at RIBA Stages 4 and 6. [PM_10_20_28]

3.6.3 Existing Buildings

3.6.3.1 The Energy Benchmarks are critical for Existing Buildings, and the first step to zero carbon for Existing Buildings shall be a reduction in energy demand. [PM_40_30_27]

3.6.3.2 To enable a clear and informed Project, a detailed survey across the entire site shall be undertaken as part of the Works, which includes energy consumption. [PM_30]

3.6.3.3 The energy reduction targets for existing accommodation as defined within Technical Annex 2H shall be achieved as a minimum for all Existing Buildings which form part of the Works. [PM_10_20_90]

3.6.3.4 Existing Buildings shall strive to achieve Net Zero Carbon in Operation, using EN15978, and as defined by the CSB.

a) Net Zero Carbon – Operational (by 2050).
   The design of Existing Buildings shall be net zero carbon for operational energy B6 (1.2) achieved annually, by 2050 as defined by the standards within the Net Zero Carbon Buildings: A Framework Definition UK Green Building Council (UK GBC). [PM_10_20_90]

b) Design to be developed to cover stages B1 – B7. [PM_10_20_90]

3.6.3.5 Net Zero Carbon in Operation shall be calculated to include regulated and unregulated energy use, following the CIBSE TM54 methodology, projected against 2050 BEIS figures for grid decarbonisation. [PM_30_30_10]

3.6.3.6 Off-site off setting is not permitted. [PM_10_20_82]

3.6.3.7 Where it is not possible or cost effective to achieve Net Zero Carbon in Operation using on-site renewables, a clear roadmap towards 2050 should be provided to the College as part of the response to Annex CS6. [PM_10_20_90]

3.7 Operational Energy and Equipment

3.7.1 Operational Energy for ICT and FFE

3.7.1.1 The Contractor shall meet the Energy Use Intensity (EUI) Target for all New Buildings. [PM_10_20_82]

3.7.1.2 The use of Legacy equipment shall not negatively impact the TM54 assessment. [PM_10_20_82]

3.7.1.3 On the basis that Legacy equipment shall be replaced over the life cycle of the Building, all Legacy; servers, ICT equipment (e.g., user devices, printers, AV etc), active infrastructure (e.g., switches and wireless access points) and FFE (Group 1, 2 and 3) for all education buildings shall adopt the new build small power benchmarks as defined in Technical Annex 2H. [PM_10_20_90]

3.8 In Use Monitoring

3.8.1 The Employer requirements for In Use Monitoring are defined within Technical Annexes 2I. [PM_10_20_90]

4. Demonstrating Compliance

4.1 Overview

4.1.1 The Contractor shall demonstrate compliance with the Employer's Requirements by use of protocols detailed in the Contractor's Quality Assurance procedures capturing evidence of both coordinated design and its implementation into the construction of the College Building(s) with photographic evidence and/or third-party accreditation. [PM_70_15]

5. Reference Standards

5.1 General Requirements

5.1.1 The following reference standards have been provided to support the development and integration of the new requirements. [PM_10_20_90]

a) CIBSE TM61: Operational Performance of buildings (2020). [FI_70_85]

b) CIBSE TM63: Operational performance: Building performance modelling and calibration for evaluation of energy in use. [FI_70_85]

c) CIBSE TM65: Embodied Carbon in Building Services (2021). [FI_70_85]

d) CIBSE TM54: Evaluating the operational performance of buildings at design stage (2013). [FI_70_85]

e) CIBSE TM40 Health and Wellbeing in Building Services. [FI_70_85]

f) CIBSE TM39 Building Energy Metering (2009). [FI_70_85]

g) CIBSE TM22: Energy Assessment and Reporting methodology (2006). [FI_70_85]

h) CIBSE Guide L: Sustainability (2020). [FI_70]

i) Designing Zero Carbon Buildings using Dynamic Simulation Modelling (L. Jankovic) 2017. [FI_70]

j) Net Zero Carbon: A framework definition (UKGBC). [FI_70]

k) LETI Climate Emergency Design Guide. [FI_70]

l) Net Zero Energy Buildings (NZEB) Concepts Frameworks and a Roadmap for Project Analysis and Implementation (2018) S. Attia. [FI_70]

m) UKGBC: Unlocking the delivery of net zero carbon buildings (2020). [FI_70]

n) CIBSE TM64: Operational performance: Indoor air Quality - emissions sources and mitigation measures. [FI_70_85]

o) CIBSE AM11: Building Performance Modelling (2015). [FI_70_85]

p) Achieving Nearly Zero Energy buildings in a changing climate (2017 – R. Salem). [FI_70]

q) Trees in Hard Landscape: A Guide for Delivery: TDAG. [FI_70]

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