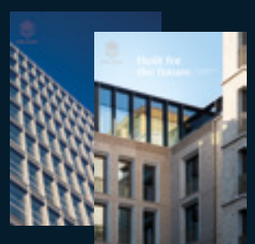
HELICAL

Designing for Net Zero/

DESIGN GUIDE

Contents



SUSTAINABILITY REPORTS
Alongside our Annual Report and Accounts we have also published our new Sustainability Strategy "Built for the Future" and our Sustainability Performance Report. Please refer to our Company website to view these reports.

Matthew Bonning-Snook
Property Director &
Chair of the Sustainability Committee

Our path to Net Zero

We set out Helical's vision and sustainability strategy in our **"Built for the Future"** document which is available on our website www.helical.co.uk. This guide document, **"Designing for Net Zero"** has been produced to aid our professional teams as they collaborate with us on our development projects from the design and construction process and through to operation and occupation. This guide is not intended to be a checklist, but instead prompts the team to be responsible in their carbon management choices.

A key part of our approach is to appoint a Carbon Champion at the commencement of each project, to help set the carbon agenda for the project in the form of a Carbon Implementation Plan (CIP). The Carbon Champion will agree the vision at the outset, brief the team and then support, monitor and document the carbon journey. Working with us the Carbon Champion will produce a draft report at practical completion which will be finalised twelve months later. This carbon report will stand as a record of the project's carbon journey and help us benchmark our performance against our aspirations and industry recognised standards and guidance.

This guide has been developed in consultation with our designers, contractors and facility managers and includes a 10-step approach to encouraging discussion and debate at each of the RIBA recognised stages. Use of this guide will allow the team to give due regard to the importance of the impact of carbon alongside the constraints of quality, cost and programme. The Built Environment has been late to address the climate challenge and it should now be at the forefront of the development process.

Built for the Future:

Our Strategy

In June 2020 Helical released its sustainability strategy **“Built for the Future”** which set out the Company’s long-term vision encompassing “Our Environment” “Our Communities” and “Our People”.

OUR KEY PRIORITIES

Under “Our Environment” we have identified two key priorities;

— **Transition to a low carbon business**

— **Buy, use and re-use resources efficiently**

We have worked to align our key priorities with the United Nation Sustainability Development Goals where relevant to our business and industry:

Our Environment

Key priority	How we will achieve this	How this will be measured
TRANSITION TO A LOW CARBON BUSINESS Carbon emissions are one of the main contributors to climate change. As a business we believe by reducing our operational and embodied carbon we are responding to the climate change crisis in the most effective way we can. Our business model is to acquire existing buildings for refurbishment or sites for development. Undertaking refurbishments will save significant embodied carbon by using the existing structure and for these projects we will look to reduce our footprint by installing energy efficient equipment and procuring renewable energy. For our new developments, we will perform a whole life cycle carbon study to pinpoint where carbon savings can be made. We believe the key to delivering lower carbon buildings is through a rigorous design process and the use of new technologies and using low carbon material where possible. **Link to Sustainable Development Goal:**	• All new build developments to be Net Zero Carbon in on-site operation by 2025 • We will aim to reduce the embodied carbon in all new developments by 20% against the current RIBA benchmark • Through adopting new technologies and promoting low carbon materials we will create a pathway to developing Net Zero Carbon buildings • Within our existing portfolio we will seek to achieve a 25% reduction in the operational carbon emissions by 2025 • We will minimise carbon emissions associated with transport to our managed assets and construction sites wherever possible • We will support tenants as they work through their fit out design and provide guidance on how they can best reduce the carbon impact of their fit out • We will ensure that our project teams are focused on eliminating the unnecessary through design • We will protect and enhance biodiversity and ecology wherever practical	• Exceed current Part L Building Regulations for target emissions rate in all new and refurbished buildings through passive design and energy efficiency • Reduce embodied carbon by a 20% percentage improvement against the current RIBA benchmark of 1100 KgCO2e/ m2 GIA ie. 880 KgCO2e/m2 GIA • Using a science bases target, we will reduce our combined Scope 1 and Scope 2 emissions by 25% by 2025 compared with 2019 base year in line with the well below 2 degree scenario • Purchase 100% green tariff electricity for managed portfolio
BUY, USE AND RE-USE RESOURCES EFFICIENTLY In a world where resources are continuing to be depleted, we have a responsibility to ensure we are smart with what we buy, consume and reuse. For our managed portfolio we will look to implement green energy contracts and engage with our tenants on how they can reduce the resources they are using, creating a cost saving for them as well as resource efficiencies. At our development sites we will look at options for using recycled materials such as aluminium, steel and any materials that can be recycled from demolition and promote the use of new low carbon materials. **Link to Sustainable Development Goals:**	• We will limit the consumption of natural resources including water in both the managed and development portfolio • We will implement appropriate waste management practices, seeking to reduce, reuse and recycle before disposal to landfill in both our managed and developed portfolio • We will integrate environmental considerations through passive design in new and refurbished buildings, seeking wherever possible to achieve good practice standards • We will ensure that project teams on Helical projects consider future recycling as part of the material choice consideration and look for opportunities to use recycled materials within our construction projects • Within the choice of materials, we will consider durability to achieve a balance of life expectancy and carbon impact • We will ensure that project teams managed by Helical refer to our Sustainability Project Management Checklist to ensure a consistent standard of environment management is applied to our projects	• As a minimum all new developments will aim to achieve BREEAM Excellent and all major refurbishments will aim to achieve BREEAM Very Good or above • Divert at least 90% of construction and demolition waste from landfill for all new developments and major refurbishments and aim for minimum of 50% recycling • Achieve a recycling rate of 50% at management properties • Reduce landlord purchased water consumption by 2% from 2019 baseline • Develop site specific Biodiversity Action Plans as appropriate on individual sites • 100% of timber sourced from legal sustainable sources and where possible from well managed sources certified by third party certification bodies accredited by the Forest Stewardship Council • Zero use of materials and substances that have potentially hazardous effects on the environment, health and wellbeing • We will encourage a design philosophy that considers the disassembly, reuse and recovery of materials at the end of life

“We have aligned the targets we set out in “Built for the Future” with this design guide to ensure our business aspirations are met. We believe this guide will result in low carbon, resilient developments which will bring long term value to the Company.”

33 Charterhouse Street, London EC1

The Carbon Champion

THE CARBON BRIEF

For each new development project Helical will appoint a Carbon Champion to drive the carbon strategy of the project.

The Carbon Champion will be a named individual appointed by Helical in a client advisory capacity. The Carbon Champion will be an experienced individual with a proven track record in MEP design, Carbon and Energy Assessments and a knowledge of Sustainability Assessments. The Carbon Champion will support Helical with early guidance on the potential to reduce carbon within the development leading to the creation of a project specific Carbon Brief and Carbon Implementation Plan (CIP).

The Carbon brief will be used to support the procurement of the design team and the Carbon Champion will help with the alignment of primary and specialist designers' scopes of services to ensure a co-ordinated and fully integrated approach to the CIP. The UKGBC document Net Zero Carbon Buildings: A Framework Definition is considered a strong reference document and outlines the process which will be adopted by the Carbon Champion and design project team.

The Carbon Champion will play a key role at the briefing stage of the project setting Helical's carbon vision for the project, its framework and the processes to be followed together with how the carbon journey is to be captured and reported throughout the life of the project.

The Carbon Brief will focus on the following carbon areas:

EMBODIED CARBON

UKGBC Definition of Net Zero Carbon as defined in Net Zero Carbon Buildings: A Framework Definition.

CARBON IN USE

UKGBC Definition of Net Zero Carbon as defined in Net Zero Carbon Buildings: A Framework Definition.

LIFECYCLE CARBON

60 – 100 year planned maintenance and replacement
The last item will focus on the integration of Facilities Management Systems for planned maintenance and replacement.

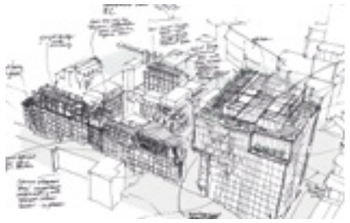
The Carbon Champion:

Scope of services

The following outlines the scope of services that will be provided by the Carbon Champion. These should be included as part of the initial discussions when nominating an advisor.

VISION

- Review Helical, national, local and institutional policies relating to carbon and consider opportunities within the proposed development
- Host a “vision workshop” to identify carbon vision and primary objectives for the development
- Work with the design team to identify the key themes and principles that will define the vision and eventual strategy for the project
- Review successful precedent developments with regards to each of the “10 steps to zero”

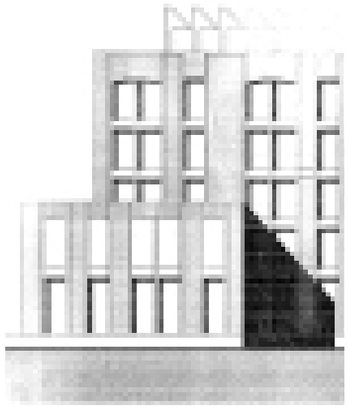


STRATEGY

- Host carbon workshops with the project team
- Consider and review applicable carbon and energy benchmarking and assessment methods for the proposed development, e.g. Design for Performance
- Work with the design team and wider project delivery team to determine the pertinent objectives, KPI’s and targets that will form the focus of the CIP
- Using the ten steps outlined on page 11, review and consider the objectives and targets against national and international benchmarks (GRESB, planning policies, industry standards, etc)
- Work with the project team to identify opportunities, solutions and strategies that will enable the objectives of the CIP to be achieved
- Consider the life-cycle carbon of systems against life expectancy, maintenance and replacement

CONCEPT

- Undertake a desktop evidence-based review of the proposed solutions to inform the carbon value appraisal of the proposed CIP
- Contribute to and support stakeholder engagement throughout the development process
- Work with Helical and the design team to capture the vision, CIP and Carbon Cost Plan for the development
- Develop a Carbon Dashboard based on the agreed Carbon Cost Plan
- Host follow up workshop with the project team to present/review the proposed CIP
- Host workshop facilities manager on post occupancy strategy for the scheme, its documentation and its monitoring



DESIGN

- Attend design development workshops/meetings to review the carbon & energy strategy and its impact of any Value Engineering (VE) options
- Update the CIP at each RIBA Stage and report to Helical and design team progress against the carbon vison
- Report on Carbon Cost Plan – credits and debits as design progresses
- Post-planning review of relevant planning conditions and section106 (s106) obligations applicable to the proposed development and the impact on carbon strategy
- At Tender Stage, review Employer’s Requirements and/or other pertinent documentation to ensure suitable reference to the project’s carbon and energy strategies
- Review contractors and sub-contractors carbon management plans and comment on suitability for corporate governance and site activity

DELIVERY & OPERATION

- Attend construction stage development workshops/meetings with a view to implementing the CIP
- Chair quarterly Carbon Steering Group meetings through to completion
- Update the CIP and report progress against targets set
- Produce quarterly update reports to inform project progress meetings
- Monitor contractors progress on commissioning strategy and delivery with reference to post occupancy
- Liaise with main contractor to track carbon progress
- Undertake periodic carbon review meetings with main contractor to monitor progress against CIP objectives

EVALUATION

- Consider and review requirements for Post Occupancy Evaluation (POE) based on industry standards, e.g. BSIRA Soft Landings Framework, BREEAM and the WELL Building Standard
- Coordinate handover meeting to brief the FM on all matters pertaining to responsible Carbon Management within the development
- Brief the Facilities Manager (FM) on the expectation for regular data collection and reporting
- FM to compile and review carbon emissions data periodically and report back to Helical with recommendations for improvement

The Carbon Implementation Plan

The Carbon Implementation Plan (CIP) is the output document from the Carbon Brief for the project and sets out how the carbon aspirations for the project will be delivered through design and construction.

The CIP is a live document that is to be reviewed regularly, updated, and modified as the project progresses. The Carbon Champion will be the owner of the Carbon Implementation Plan. The key stages are set out below:

VISION

Early in the development process the Carbon Champion will engage with Helical, advising and reviewing aspirations against relevant policies and targets. Through workshops and working with Helical's other advisors, the vision will identify the themes and principles and seek to assign responsibility for development opportunities for carbon efficiency. This period is an opportunity to reflect on successes from previous projects and gather knowledge and experience to formalise the vison for the path to net zero.

CHARTER

Through the "10 steps to zero" process the design team will identify realistic targets and the requirements of planning and other policies relevant to the project along with national and international standards (GRESB, etc) at the time. These will be set out in a project specific charter and include KPI's and targets that will be referenced and measured against.

STRATEGY

It is during this phase that the CIP will be fully documented. Using a desktop, evidence-based analysis of the project, solutions and the appraisal processes of the carbon strategy will be set out. Once completed the CIP will be presented to the project team.

DESIGN

With a CIP in place the team will carry out design-based reviews and workshops to turn the charter and strategy into implementable design changes. This will happen in parallel with the design development process of; propose, review, challenge and repeat. The Carbon Champion will monitor and report on the progress as it pertains to carbon and update the CIP and strategy, as necessary. At the conclusion of design and the implementation of the tender stage the Carbon Champion will ensure the aspirations of the CIP are part of the tendering process and will assist in the evaluations of prospective parties for their compliance to the CIP.

DELIVERY

The delivery of any project is often the most challenging and subject to changes. As such the Carbon Champion must engage with the main contractor and design team to bridge the gap of understanding between intent and delivery. This also presents an opportunity as many contractors and sub-contractors have first-hand knowledge that can assist or identify additional areas where carbon efficiency can be made. These opportunities can only be realised if acted upon quickly as maintaining programme is critical during the delivery stage.

Throughout the process above the CIP should be conscious of the impact on the handover and post occupancy period. The design and construction phase are only the first two of the development lifecycle.

OPERATION

Following the completion of the project the CIP becomes the domain of the Facilities Manager (FM). The FM will review the CIP on a regular basis and ensure the systems are in place to manage carbon in use and whole life maintenance and replacement and follow the same principles as those set out through the design and construction phases.

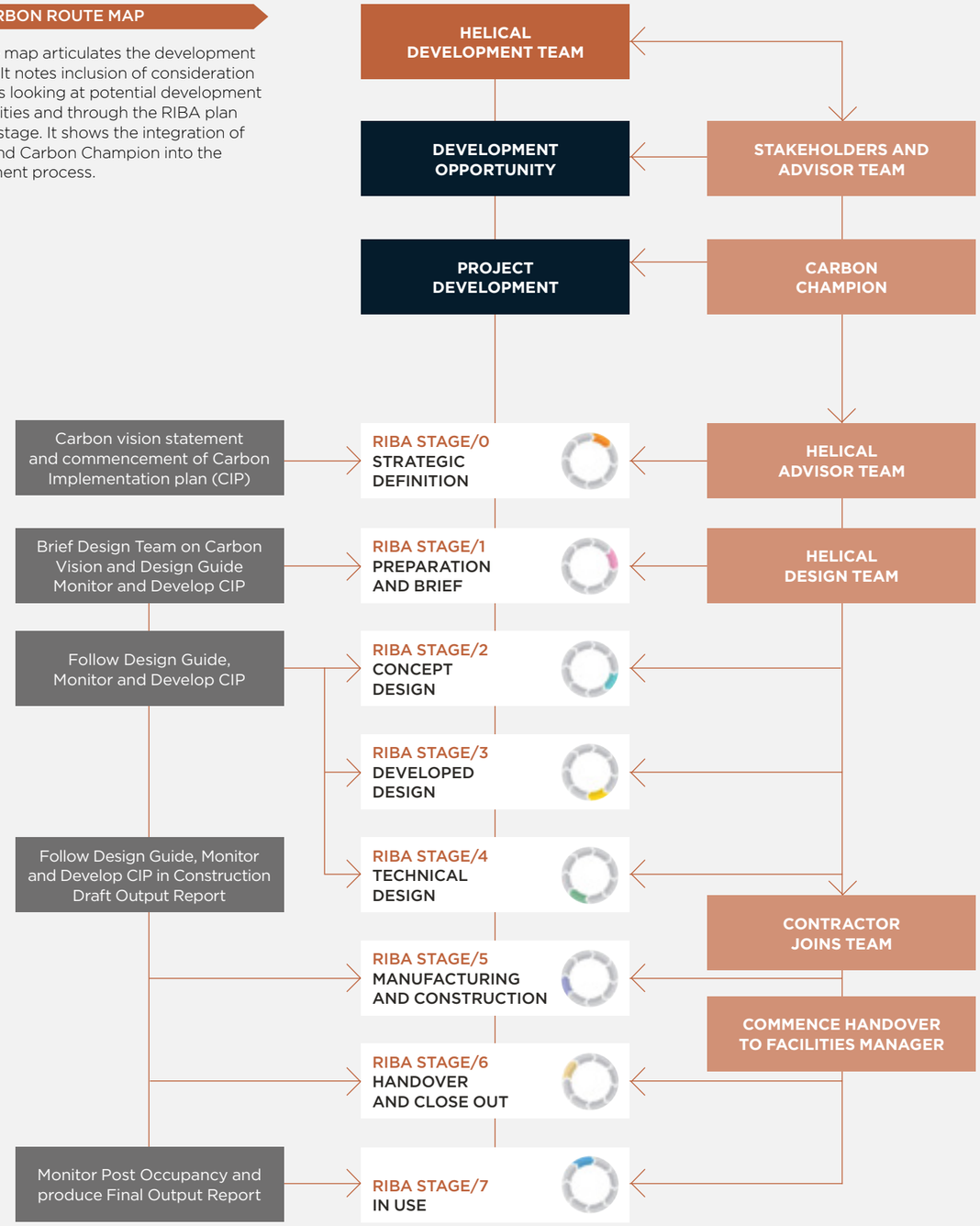
RIBA PLAN OF WORKS

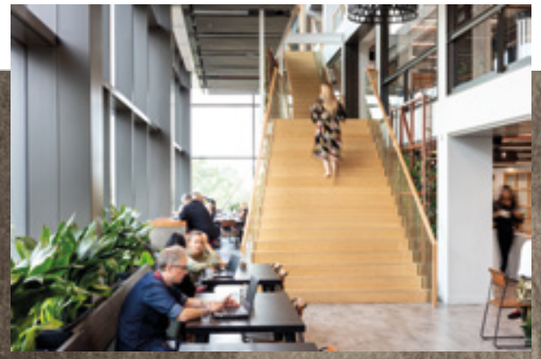
These steps are set out to follow chronologically the 7 stages of the RIBA plan of work and will be familiar to the design team. This encourages the team to think about responsible carbon management throughout the design. The earlier these considerations are made the greater the opportunity there is to include low carbon methods, materials and MEP into the project.

- RIBA STAGE/1 PREPARATION AND BRIEF
- RIBA STAGE/2 CONCEPT DESIGN
- RIBA STAGE/3 DEVELOPED DESIGN
- RIBA STAGE/4 TECHNICAL DESIGN
- RIBA STAGE/5 MANUFACTURING AND CONSTRUCTION
- RIBA STAGE/6 HANDOVER AND CLOSE OUT
- RIBA STAGE/7 IN USE

THE CARBON ROUTE MAP

The route map articulates the development life cycle. It notes inclusion of consideration as early as looking at potential development opportunities and through the RIBA plan of works stage. It shows the integration of the CIP and Carbon Champion into the development process.





10 Steps to Net Zero

These steps are not meant to be prescriptive or a checklist. They are compiled through experience and can be built upon in later revisions of this document as perceptions, technology and legislation changes. Each step is meant to act as a prompt to initiate discussion by the design team at the relevant stage such that the design can be challenged for its carbon efficiency ensuring opportunities are not missed. In the same way the scheme is challenged under the three core precepts of cost, quality and programme, if the climate challenge is to be met then the built environment has to put carbon at the same level of priority.

The design team, with assistance from the Carbon Champion and through the CIP will collect information and analysis about the carbon constraints around the project. Throughout the 10 steps they will develop and feedback solutions and incorporate these into the project design.

The end result should be a design that has been through a rigorous carbon review process at every stage of the design process and a factual summary of the decisions made to tell the carbon story of the development.

The Carbon Champion will coordinate the carbon reporting template for embodied carbon, operational carbon and life-cycle carbon at each RIBA stage, using the UKGBC carbon reporting templates (appended for information) as appropriate.

These carbon reporting outputs will be accompanied by the Carbon Decision Matrix (a copy of the reporting templates can be found on Helical's website) to summarise any differences between the targets and the stage assessments and include an update on the carbon cost plan. Input will be required from the design team, which will be coordinated by the Carbon Champion.

At the design and construction stages updates will be provided at design and construction meetings to highlight any risks that targets might not be achieved with recommendations for mitigation and improvements.

The following 10 steps will act as a series of prompts to ensure that carbon is considered at every part of a development, from initial planning through to post occupancy.

1
Site Planning and Building Form

2
Optimising Facades

3
Optimising Materials and Construction Choices

4
Design Performance

5
Specifying Efficient Landlords Systems

6
Recommending Efficient Tenant Systems

7
Specifying Intelligent Controls/Capturing Data

8
Manage Occupant Expectations

9
Specifying On-site Renewables

10
Monitor and Verify

1 SITE PLANNING AND BUILDING FORM

Early design considerations

Fundamentals such as size and orientation of a scheme can have dramatic effects on the carbon efficiency of a project. It highlights the importance of early awareness and the consequent decision making.

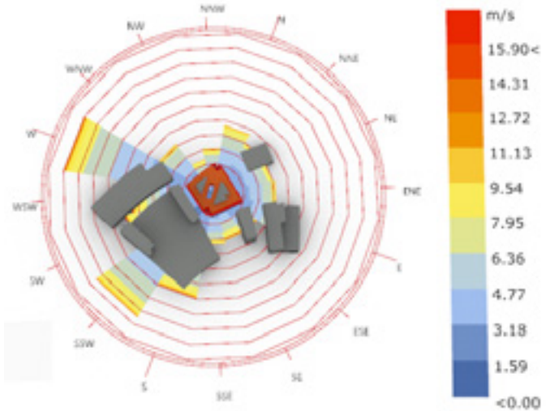
- Identify site constraints & opportunities – noise, vibration, land contamination, prevailing wind, air quality, travel, infrastructure and budget and how they may impact on the development
- Identify site limitations – height, footprint, shading from adjacent buildings, planning constraints and how they may impact on the Building form
- Produce a model of the building and carry out dynamic simulation of orientation and massing
- Optimise building mass, orientation and performance to inform architect's feasibility study
- Consider floor plan depths required for natural & mixed mode ventilation options
- Undertake options study of passive design benefits including balconies, winter gardens & shading
- Undertake design studies for climate adaption, design life and longevity
- Update studies as site information develops

Link to RIBA plan of works:

RIBA STAGE/0 STRATEGIC DEFINITION

RIBA STAGE/1 PREPARATION AND BRIEF

RIBA STAGE/2 CONCEPT DESIGN



Thermal Mass Models can be used to establish and to study the environmental impact to the buildings.

Building orientation can have a dramatic effects on the performance of the building.

Early basic design decisions such as building orientation can have a profound impact on the building's Carbon performance. Step 1 encourages early consideration of key criteria.

2 OPTIMISING FACADES

Facade analysis

After orientation and size, the building's envelope will have the next biggest impact to its efficiency:

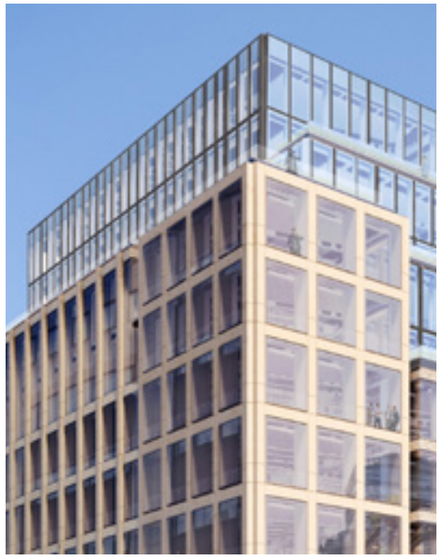
- For the building form, undertake high level optimisation for solar gain, overheating, daylight, energy and carbon – establish extent of glass per façade to inform the feasibility study
- Assess the benefits of shading
- Consider viability of natural ventilation and mixed mode and future proofing for its later adoption
- Set baseline and stretch targets for minimising solar gain and reducing carbon
- Set baseline for air leakage
- Set strategy for blind use and their specification (if required)

Link to RIBA plan of works:

RIBA STAGE/1 PREPARATION AND BRIEF
RIBA STAGE/2 CONCEPT DESIGN
RIBA STAGE/3 DEVELOPED DESIGN

SHOWING TYPICAL MIXED MODE PERFORMANCE OVER A YEAR

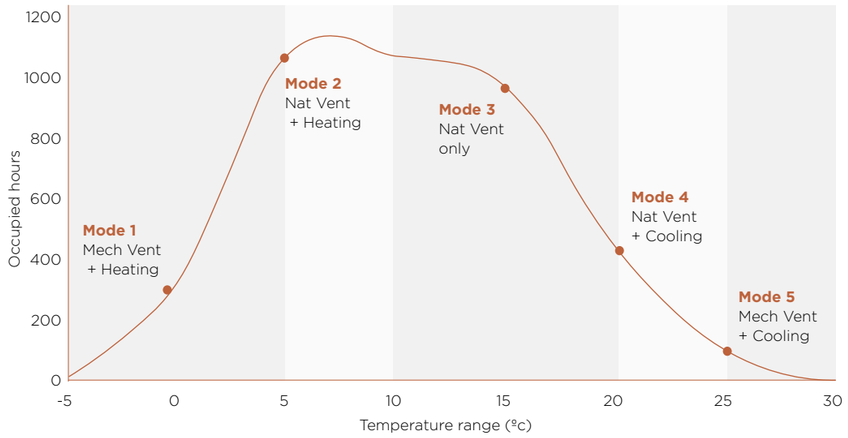
Subtle elements to the façade can have significant effects in the solar gain of buildings. The below diagram shows a typical mixed mode performance of a building over the year.



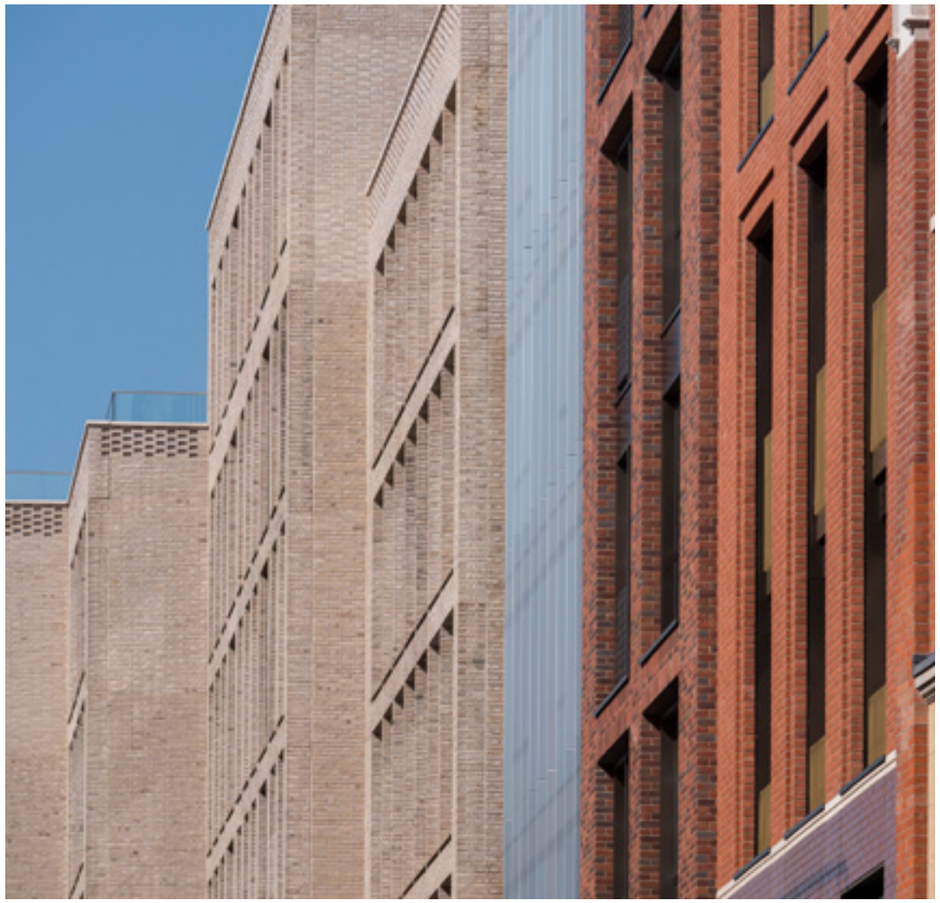
Typical percentage of Embodied Carbon in a buildings facade

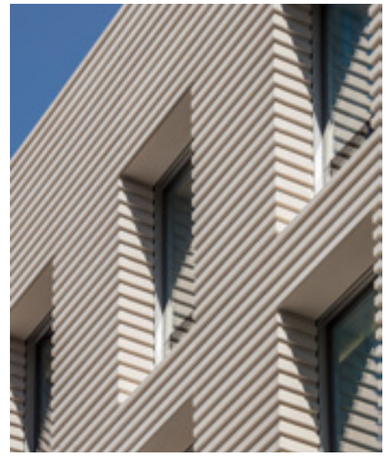
13%

SHOWING TYPICAL MIXED MODE PERFORMANCE OVER A YEAR



The facade typically accounts for 13% of a Building's Embodied Carbon and significantly impacts on Operational Carbon through heat gain or loss. This can be minimised through appropriate analysis and choice of materials.





Materials

It is a fine balance between internal comfort, façade efficiency and aesthetic. The below steps outline a number of considerations that should be undertaken when deciding on the façade material.

- **Analysis of façade materials for:**
  - Whole Life Carbon
  - Sourcing & Availability
  - Longevity
  - Robustness
  - Recycling
- **Choice of solution with consideration:**
  - Embodied & Life-Cycle Carbon
  - Maintenance, Cleaning & Replacement
  - U&G Values
  - Modularisation & Design for Manufacture and Assembly (DFMA)
  - Life Expectancy
  - Fire Performance
  - Acoustic Performance
  - Air Leakage
  - Deconstruction
- **Design for avoidance:**
  - Façade Cleaning Systems
  - Consider the use of shading, (e.g. deep reveals/ Balcony)
  - Glazing Below Sill Height

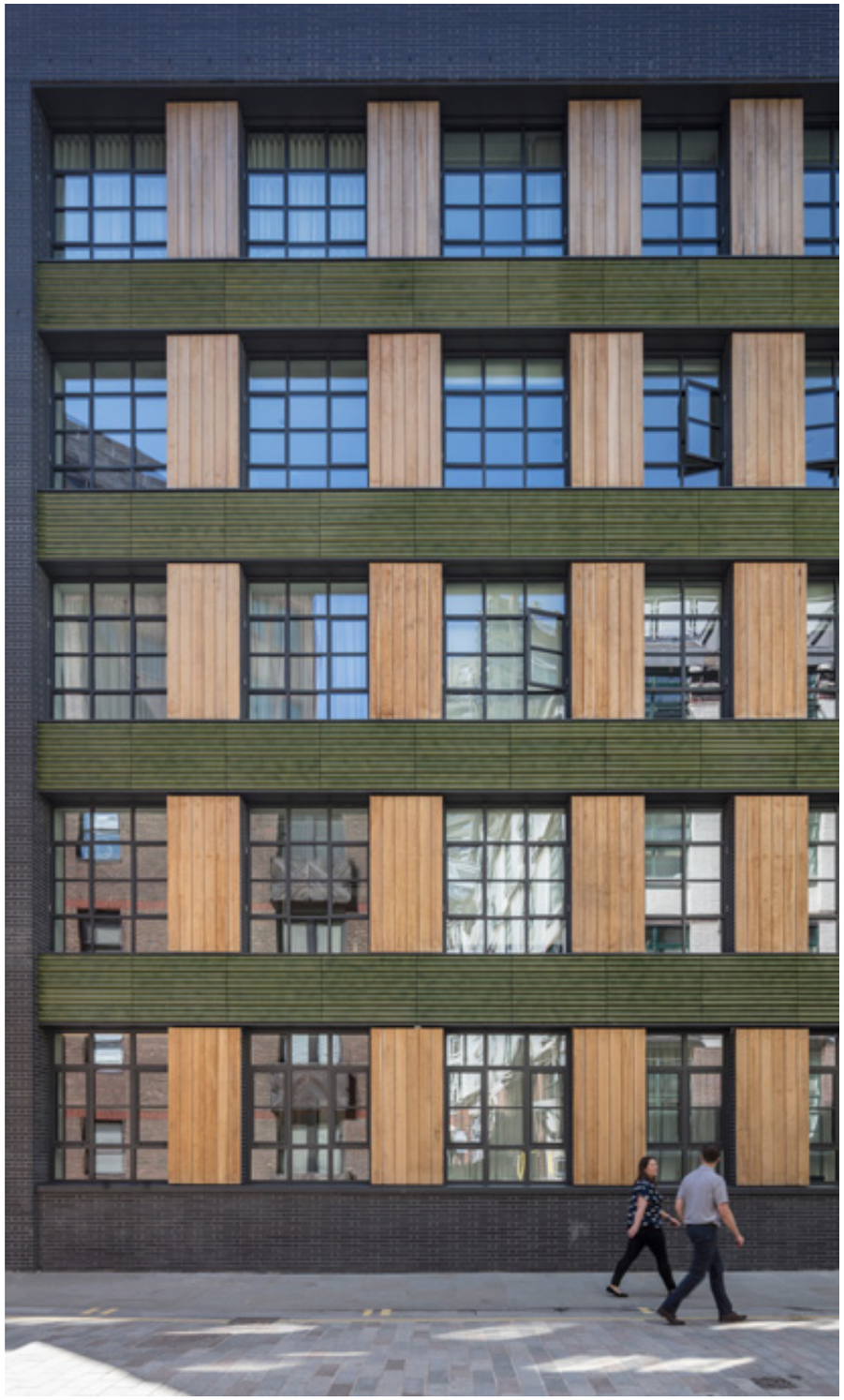
Link to RIBA plan of works:

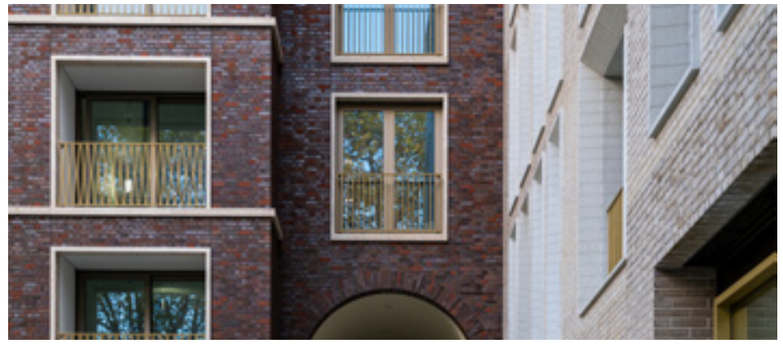
RIBA STAGE/2 CONCEPT DESIGN
RIBA STAGE/3 DEVELOPED DESIGN
RIBA STAGE/4 TECHNICAL DESIGN

3 OPTIMISING MATERIALS AND CONSTRUCTION CHOICES

Material Choices

The choice of materials is fundamental to the embodied and whole life carbon of a building and requires detailed consideration along with other key design criteria. An approach of selecting the right low carbon materials, minimising the quantity of those materials and optimising their performance.





Embodied & life-cycle Carbon

CONSIDERATIONS
Both upfront embodied carbon and whole life-cycle carbon should be considered when selecting building materials.

TYPICAL DISTRIBUTION OF EMBODIED CARBON IN A BUILDING

Building Envelope	13%
Building Services	14%
Interior & Fit-out	8%
Sub & Super Structure	65%

- **Sub & superstructure consider:**
  - Whole Life Carbon
  - Structural Grid
  - Weight & Capacity
  - Flexibility
  - Recycled Materials
  - Services Strategy & Coordination
  - Availability
  - Acoustic & Fire Properties
  - Robustness & Durability
  - Repurposing & Reuse
- **Building envelope**
  See Step 2 – Façade Optimisation
- **Building services**
  - Combustion Free Building
  - PVC Free Building
  - Alternative Materials
  - OMIT Ceilings & Floors
  - Modern Methods of Construction (MMoC) and Design For Manufacture and Assembly (DFMA)
- **Fit-out**
  Consider producing a Tenant Net Zero Carbon Design Guide

Link to RIBA plan of works:

RIBA STAGE/1 PREPARATION AND BRIEF	RIBA STAGE/2 CONCEPT DESIGN
RIBA STAGE/3 DEVELOPED DESIGN	RIBA STAGE/4 TECHNICAL DESIGN
RIBA STAGE/5 MANUFACTURING AND CONSTRUCTION	

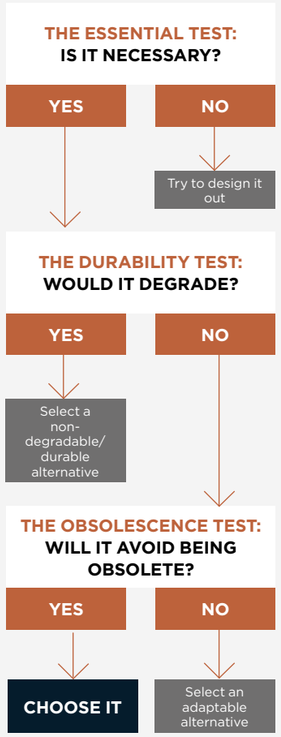
3

OPTIMISING MATERIALS AND CONSTRUCTION CHOICES

Lean Design

The tool kit for delivery

Step by step considerations on durability, longevity & adaptability.



The example decision matrix ensures that the durability, longevity and adaptability are considered when making design and construction decisions.

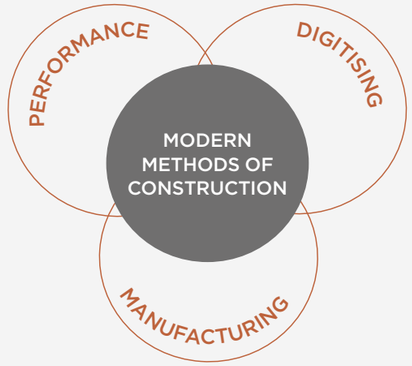
- **Delivery toolkit considerations:**
  - Durability, longevity & adaptability.
- **Review & challenge existing key design criteria:**
  - Design Life
  - Design Loads (BCO & Industry Criteria)
  - Minimise Materials
  - Quantum/Necessity of Basements
  - Specify Recycled Content
  - Embodied & Lifecycle Carbon
- **Modular design considerations:**
  - Standard Grid & Storey Height
  - Simplicity & Repetition
  - Kit of Parts Approach
  - Test Tenancy Split
  - Risers – Vertically and Accessibility
  - Plant Areas Close to Risers
  - Simple Thermal Boundary
  - Simple Fire Compartments
  - Simple Drainage
  - Robustness
  - Recycle

Link to RIBA plan of works:

RIBA STAGE/2 CONCEPT DESIGN	RIBA STAGE/3 DEVELOPED DESIGN

Lean construction

Modern methods of construction (MMOC)



DIGITISING
Delivering better, more certain outcomes using digital technologies like BIM

MANUFACTURING
Improving productivity, quality and safety by increasing the use of manufacturing

PERFORMANCE
Optimising whole life performance through the development of energy efficient, smart assets

The carbon agenda also allows for the adoption of alternative construction methodologies and new technologies that go hand in hand with the goal of saving carbon. These can be capitalised on if thought about early enough.

- **Adopt modern methods of construction (MMOC)**
- **Implement a design for manufacture and assemby (DFMA) strategy:**
  - Equipment
  - Plant Rooms
  - Risers
  - Cupboards
  - Toilets
  - Showers
  - Stairs
- **Target a reduction in waste**
- **Consider robustness & longevity**
- **Consider day one shell & core only**
- **Engage with contractors and supply chain**

Link to RIBA plan of works:

RIBA STAGE/2 CONCEPT DESIGN	RIBA STAGE/3 DEVELOPED DESIGN
RIBA STAGE/4 TECHNICAL DESIGN	RIBA STAGE/5 MANUFACTURING AND CONSTRUCTION

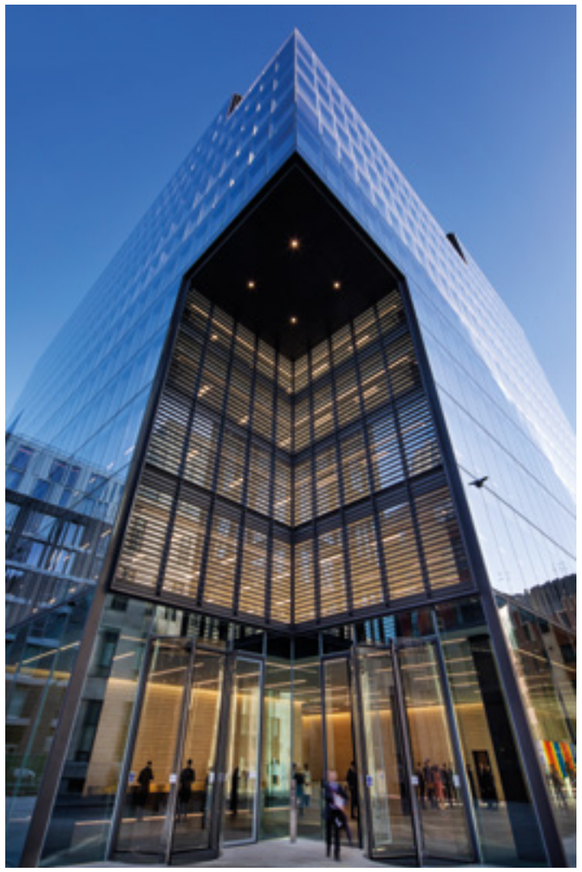
DMFA AND MMOC BENEFITS
- Minimising on-site lead time
- Improved quality and programme
- Proven performance
- Minimising spares and waste
- Improved Health and Safety
- Environmental Gains

4

DESIGN PERFORMANCE

It is understood that Net Zero Carbon is a challenging undertaking and to achieve it will require a commitment to meeting demanding performance targets. The targets set must be realistic and appropriate for the project, benchmarked against industry standards.

Challenging energy



Energy performance targets

OFFICE

BASELINE

225

kWh/m2 (GIA)

2020

103

kWh/m2 (GIA)

2025

90

kWh/m2 (GIA)

2030

70

kWh/m2 (GIA)

PARIS PROOF

55

kWh/m2 (GIA)

Setting upfront energy targets before the building is occupied will establish a baseline that future performance can be measured against.

- Consider signing up to and adopting design for performance with the Better Building Partnership (BBP)
- Establish energy performance targets – both baseline & stretch targets
- Define landlord / tenant split and opportunities for the tenants fit out
- Carry out detailed performance modelling
- Monitor outcomes throughout design, construction and operation – be prepared to adjust targets

Link to RIBA plan of works:

RIBA STAGE/1 PREPARATION AND BRIEF	RIBA STAGE/2 CONCEPT DESIGN
RIBA STAGE/3 DEVELOPED DESIGN	RIBA STAGE/4 TECHNICAL DESIGN
RIBA STAGE/5 MANUFACTURING AND CONSTRUCTION	RIBA STAGE/6 HANDOVER AND CLOSE OUT
RIBA STAGE/7 IN USE	

5

SPECIFYING EFFICIENT LANDLORDS SYSTEMS

Efficient Optimal Systems

Buildings that are adaptable and have well thought through systems will stand the best chance for life time carbon benefits.

- **Review design criteria for impact on building energy & carbon**
- **Optimise design criteria**
- **Challenge BCO & industry standards**
- **Key criteria:**

– Occupancy

– Small Power IT Loads

– Temperature Range

– Lighting Levels

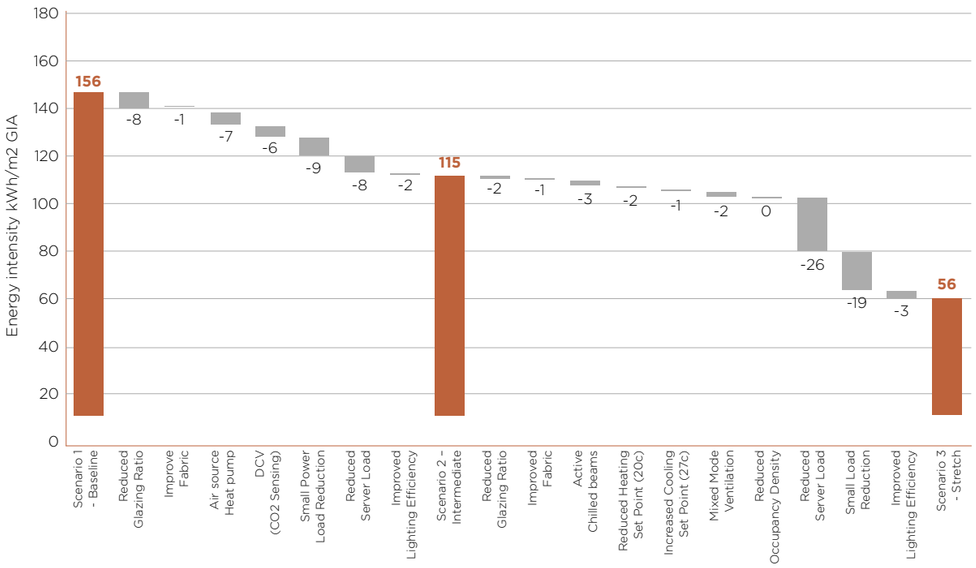
– Ventilation Rates

- **Undertake HVAC options studies**
- **Optimise plant and riser locations for energy performance**
- **Design low velocity ductwork & pipework systems**
- **Assess resilience & adaptability of key systems**

Link to RIBA plan of works:

RIBA STAGE/1 PREPARATION AND BRIEF	RIBA STAGE/2 CONCEPT DESIGN
RIBA STAGE/3 DEVELOPED DESIGN	RIBA STAGE/4 TECHNICAL DESIGN

AN APPROACH TO CARBON REDUCTION TO ACHIEVE NZC



Overspecified and oversized systems are inefficient to own and operate leading to a higher carbon cost. Optimising the systems starts at design stage through challenging design standards, understanding intended use and the tenant's requirements. Adopting "a same as usual" approach will not achieve the carbon outcomes required.

TYPICAL DISTRIBUTION OF ENERGY USE IN A BUILDING

Lighting	12%
Lifts	3%
Cooling	16%
Ventilation	10%
Heating	5%
Hot Water	4%
IT Appliances/Internet	50%

6

RECOMMENDING EFFICIENT TENANT SYSTEMS

Collaborate and Engage

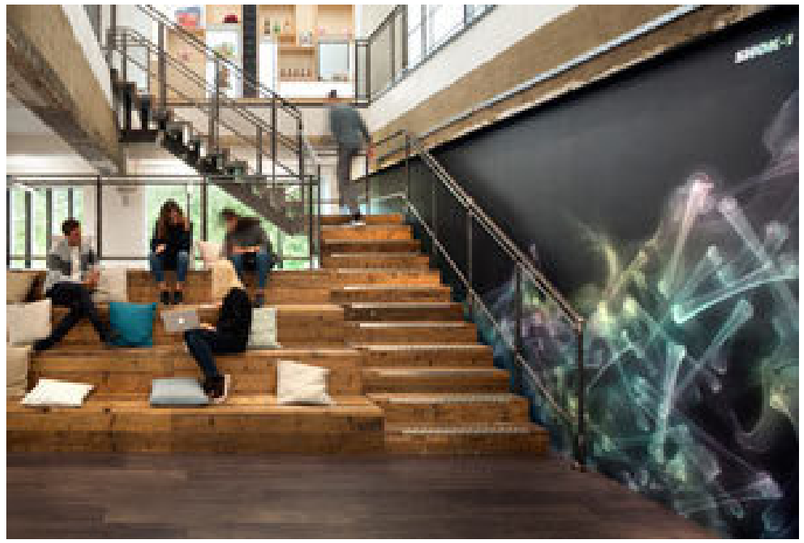
(RIBA STAGES 2-4)
The market is constantly changing and will do so throughout the life of a project. Buildings challenging preconceived notions of tenant requirements stand the best chance to capitalise on carbon savings.

- **Set design criteria for tenant fit-out:**
  - Occupancy
  - Small Power
  - IT Loads
  - Temperature Range
  - Lighting Levels
  - Ventilation Rates
- **Challenge BCO & industry standards**
- **Consider shell & core options and tenant specific design**
- **Review design criteria for impact on building energy & carbon**
- **Optimise design criteria**
- **Test HVAC options for tenant fit-out**
- **Produce tenant fit-out guide & model schemes**
- **Engage with tenants**

Link to RIBA plan of works:

RIBA STAGE/2 CONCEPT DESIGN	RIBA STAGE/3 DEVELOPED DESIGN
RIBA STAGE/4 TECHNICAL DESIGN	

A Building will only achieve a Net Zero Carbon outcome through the combined efforts of a Landlord and its tenants. Supporting tenants in minimising fit out requirements together with optimising use of the base systems is essential.



7

SPECIFYING INTELLIGENT CONTROLS/CAPTURING DATA

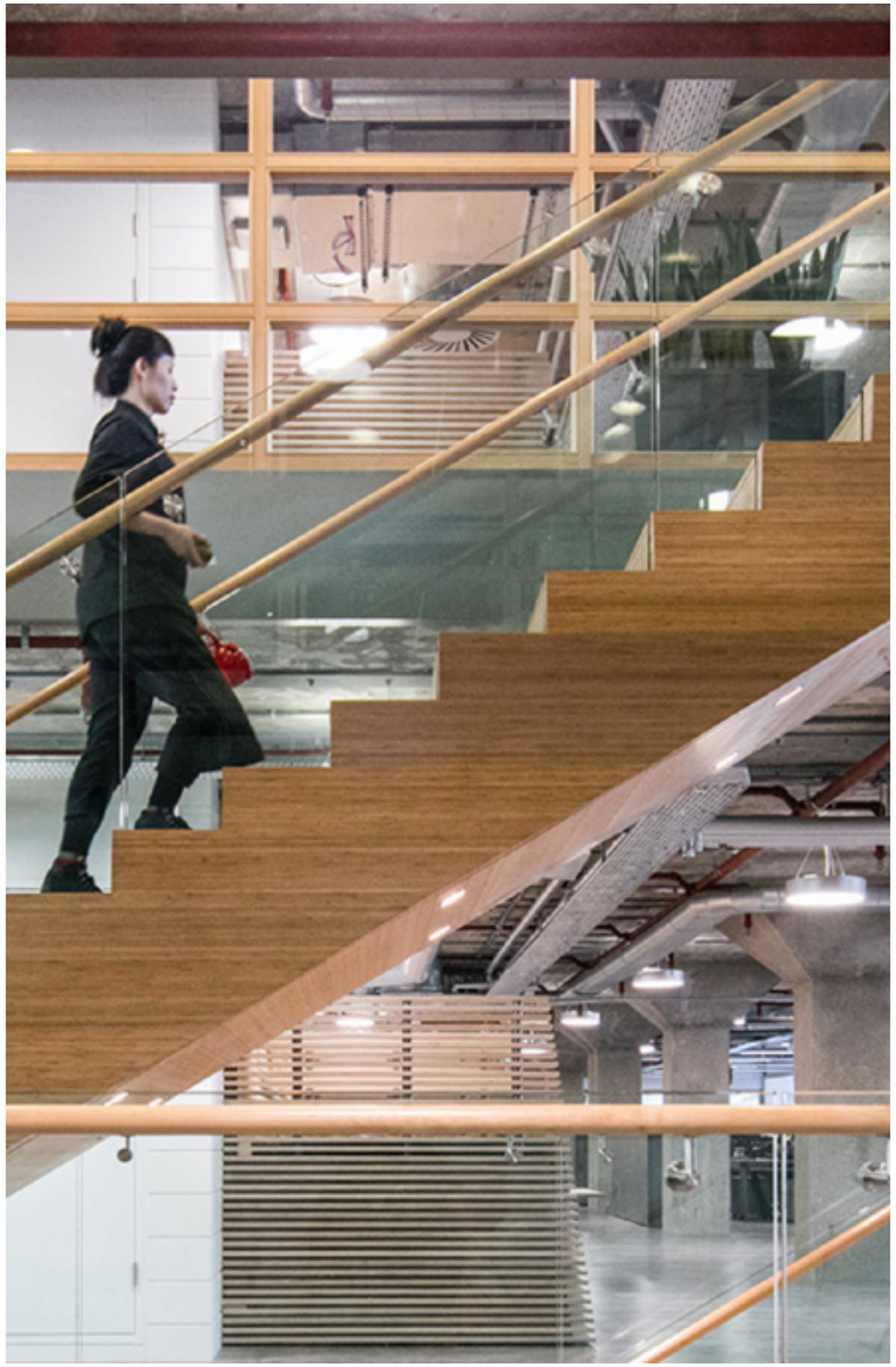
Data Strategy

Ensuring there are proper controls and procedures around collecting data will lead to better analysis and engagement both with landlords systems and tenants. The built environment is late to the information age but it is the best tool for collaborative engagement with end users to change energy practices.

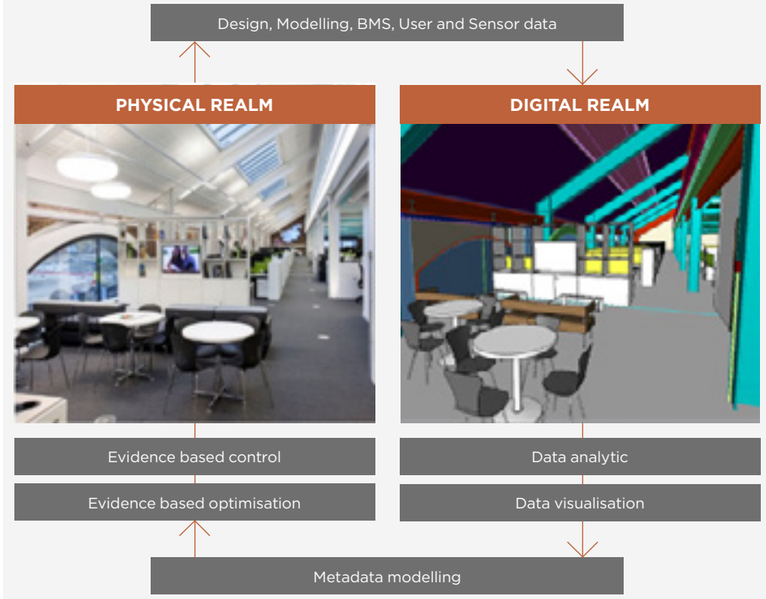
- Set a data strategy for the development – what data do you want & why?
- Capture performance data for in-use analysis
- Use appropriate technology to optimise measurement, performance and comfort
- Adopt human-centric approach to building control systems
- Display building performance data to engage users
- Set strategy for tenants data capturing and sharing
- Create a data community with common goals
- Consider a digital twin
- Consider operating & maintenance data requirements

Link to RIBA plan of works:

RIBA STAGE/2 CONCEPT DESIGN	RIBA STAGE/3 DEVELOPED DESIGN
RIBA STAGE/4 TECHNICAL DESIGN	RIBA STAGE/5 MANUFACTURING AND CONSTRUCTION
RIBA STAGE/6 HANDOVER AND CLOSE OUT	RIBA STAGE/7 IN USE



Digital Twin used to optimise energy consumption



An essential part of achieving Net Zero Carbon is understanding how building systems are performing and using energy. Capturing Data and using it to optimise performance, testing proposed changes and planning maintenance will be essential.

8

MANAGE OCCUPANT EXPECTATIONS

To achieve Net Zero Carbon will require changes to our buildings, systems and systems performance, this will require explanation and engagement with building users and stakeholders for them to understand and appreciate the wider benefits.

User Engagement

Communication with tenants is vital when setting expectations on how the building will operate and perform.

- Summarise zero carbon objectives and intended operational strategy
- Clarify limitations on comfort if different from user expectations (eg extended summer temperatures)
- Clarify roles & responsibilties for monitoring, operating & maintaining buildings particularly between landlord and tenant
- Monitor provision of user guidance
- Communicate information to all users

Link to RIBA plan of works:

RIBA STAGE/5 MANUFACTURING AND CONSTRUCTION

RIBA STAGE/6 HANDOVER AND CLOSE OUT

RIBA STAGE/7 IN USE

9

SPECIFYING ON-SITE RENEWABLES

A vital part of achieving Net Zero Carbon will be the adoption of renewable energy integrated with the design and form of the building. Where renewables are provided the benefits should be clear and users engaged with its performance and operation.

Green Options

The opportunities to adopt on site renewable technology for energy generation or conservation should be a key driver for every project on the path to net zero. The below are some considerations regarding this.

- Options study for local renewable energy, where available
- Consider local low-carbon heating/ cooling networks
- Assess solar pv and opportunity for battery storage as part of power demand management strategy
- Integrate with electric vehicle charging provision where appropriate
- Purchase green energy
- Make on site renewables story visable and engage with users

Link to RIBA plan of works:

RIBA STAGE/2 CONCEPT DESIGN	RIBA STAGE/3 DEVELOPED DESIGN
RIBA STAGE/4 TECHNICAL DESIGN	

Solar energy – PV

Solar energy is radiant heat and light from the sun that is harnessed by photo voltaic cells to produce electricity.

Solar energy – Hot water

Solar energy is radiant heat and light from the sun that is harnessed by solar panels to produce hot water.

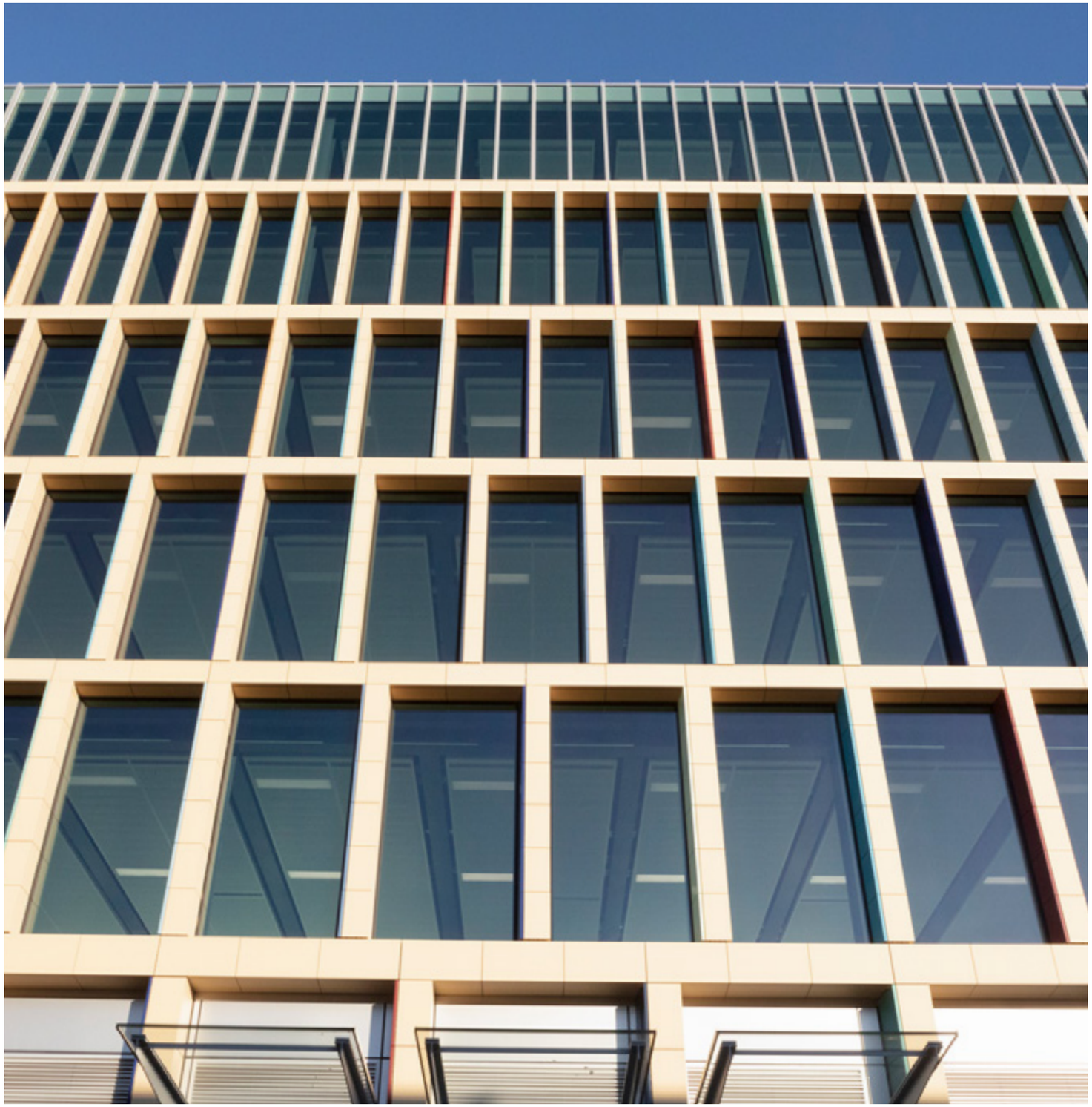
Wind energy

Wind energy is the use of air movement to drive turbines that drive generators to produce electricity.

Biomass energy

Biomass has stored energy that is released through the process of incineration to produce heat.

10 MONITOR AND VERIFY



An essential part of the drive to Net Zero Carbon will be the ability to see how the Building is performing and sharing that information. Through sharing, best practice can be developed, creating a circle of continuous improvement to the benefit of all.

Feedback

There is no greater metric to carbon saving than in-use data. The building's design parameters and how it ultimately performs need constant adaptation, analysis, calibration and then further monitoring to ensure optimum performance and minimum wastage. Like an instrument, without constant tuning it will never sound right.

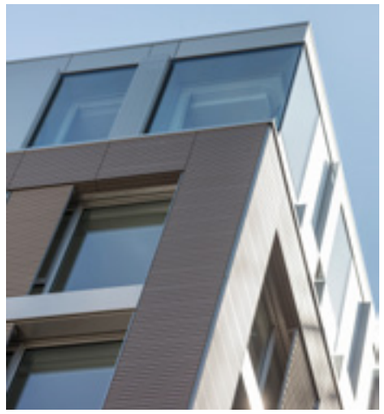
- Carbon assessments should be updated at completion of construction and monitored in operation
- Measured energy performance needs to be compared with the agreed completion targets and monitored in operation
- Carbon – offsets to be updated and declared
- Create a building dashboard
- Share performance with stakeholders and building users
- Publish data

Link to RIBA plan of work:

RIBA STAGE/7
IN USE

Benchmarking

Meeting our aspiration for all new developments to be Net Zero Carbon in operation by 2025.



ASPIRATION

The Helical aspiration is that all future developments should aim to achieve Net Zero Carbon in operation by 2025 ahead of the RIBA Climate Challenge target. This is a demanding and challenging ambition. Design teams must embrace and see as an opportunity to be creative and innovative. Setting a goal and an aspiration to achieve it is fundamental for success. However, each project will have its own unique challenges and therefore it may not be possible to meet the Net Zero aspiration all of the time. That said, any modification to the carbon target will only be considered following a full and detailed review of the carbon implications and options to mitigate any increase.

Helical accept the Net Zero Carbon aspiration will require considerable change to what has been accepted as industry standard solutions and products in the past. This is seen as an opportunity for Design teams to work with stakeholders and to be creative and innovative in the solutions offered but not at the expense of commercial success.

An initial benchmarking exercise should be carried out at RIBA Stage 2 which sets a plan to achieving Net Zero Carbon as outlined by UKGBC & RIBA and will form a key part of the CIP. This will require very clear allocation of carbon and energy against the requirements in the form of a Carbon Cost Plan. All design decisions must be considered against the Carbon Cost Plan and the implications understood.

CONSCIOUS CONSTRUCTION

On occasion the pursuit of carbon conscious construction may result in conflict with other established criteria for the successful delivery of a development, such as BCO, insurance and market driven factors. Where this is the case, the team are encouraged to engage and debate the implications to find the path forward.

The design team will be required to plan the buildings carbon and energy journey to achieving Net Zero and monitor progress as a gateway to the next stage of design.

RIBA 2030 CLIMATE CHALLENGE TARGET METRICS FOR NON-DOMESTIC BUILDINGS

RIBA sustainable outcome metrics	Current Benchmarks	2020 Targets	2025 Targets	2030 Targets	Notes
Operational energy kWh/M²/y	225 DEC D RATED (CIBSE TM46 BENCHMARK)	<170 DEC C RATED	<110 DEC B RATED	<0-50 DEC A RATED	UKGBC Net Zero framework: 1. Fabric first 2. Efficient services and low carbon heat 3. Maximise onsite renewable 4.Minimum offsetting using UK schemes (CCC)
Embodied Carbon Kg/CO_2e/m²	1100 M4I BENCHMARK	<800	<650 M4I BENCHMARK	<500 M4I BENCHMARK	RICS Whole Life Carbon (A-C): 1. Whole Life Carbon Analysis 2.Using Circular economy strategies 3.Minimum offsetting using UK scheme (CCC)

Post occupancy

Measuring operational energy performance.

OBJECTIVE

The primary aim of post occupancy evaluation is to measure operational energy performance when the building is occupied, i.e. during RIBA stage 7 (Use). This will allow measured performance to be compared with the target set for the project (measured in kWh/m2./yr).

The embodied and life-cycle carbon assessments should have been completed and updated at the end of construction at RIBA stage 6 (Handover) and compared with the carbon targets, considering any product substitutions or material changes.

During the life of the project, refurbishments should adhere to the principles of environmentally responsible modifications, replacements and upgrades. This means that minor and major refurbishments and replacements of parts should aim to provide long-term resilience and use materials of low embodied carbon. This will require engagement with the Facilities Management team and tenants throughout design, handover and use to achieve the right balance of capital expenditure, maintenance and replacement during its life cycle.

ENERGY MONITORING AFTER 3 MONTHS

When a multi-let building is substantially occupied, say 50% occupancy, energy monitoring after 3-months should be extrapolated to estimate annual energy consumption. This should be normalised to account for the level of building occupation and normalised for weather data. Reference should be made to the Better Buildings Partnership (BBP) protocol for how energy consumption should be assessed and reported for Design for Performance validation (this protocol is being developed).

A gap analysis report should be issued to explain any differences between the target energy consumption and measured consumption, with recommendations for actions if annual energy consumption is predicted to exceed the target.

Example Building Dashboard Displayed in a Building

ENERGY MONITORING AFTER 6 MONTHS

An interim update of the energy performance should be undertaken six months after substantial occupation and extrapolated to estimate annual energy consumption. Adjustments to account for partial occupation and weather normalisation should apply.

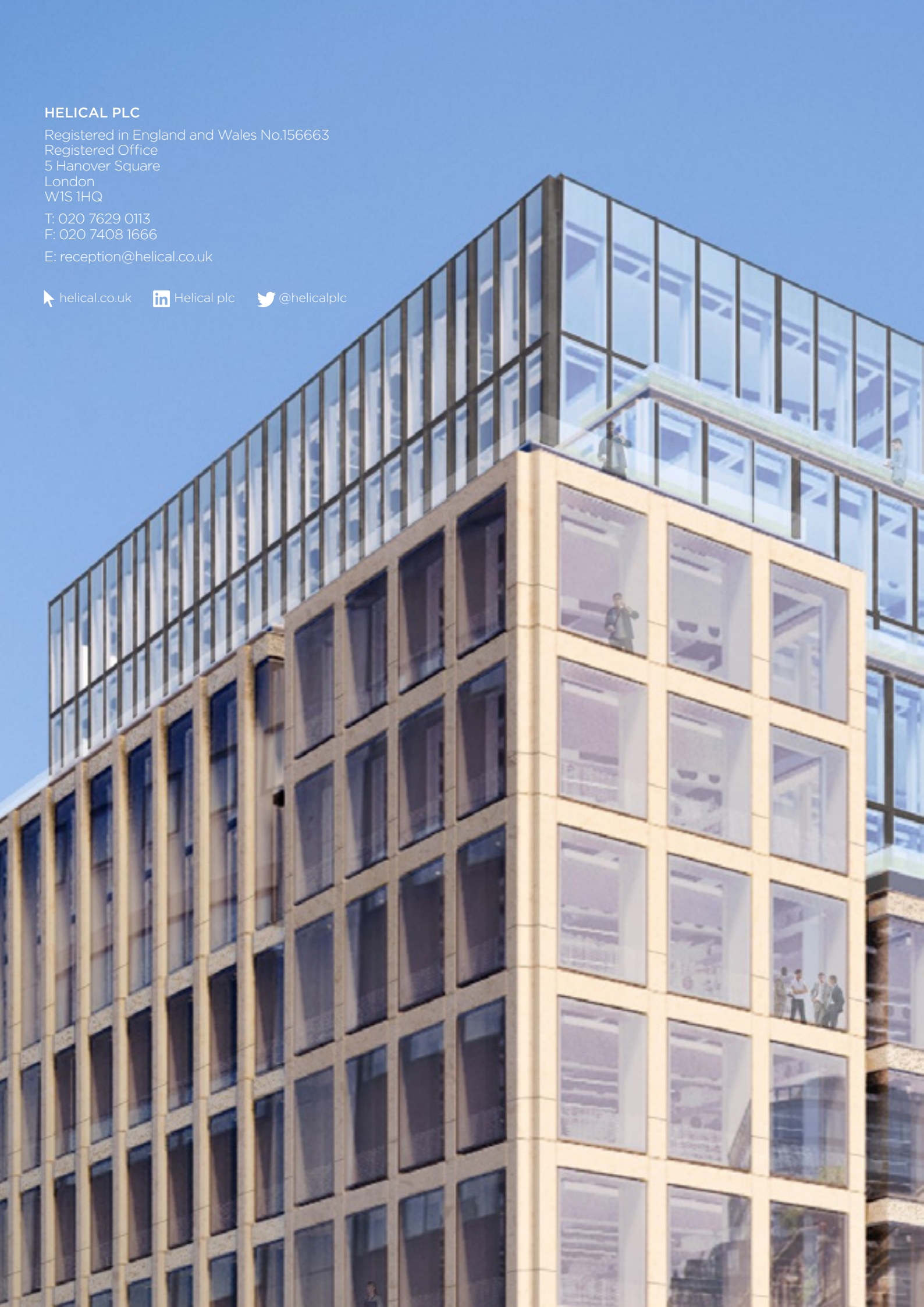
A gap analysis report should be issued to explain any differences between the target energy consumption and measured consumption, with recommendations for actions if annual energy consumption is predicted to exceed the target.

ENERGY MONITORING AFTER 1, 2 AND 3-YEARS

The Carbon Champion should have a retained role to check the measured energy performance for the 3 years after occupation and prepare gap analysis reports at the end of these years. The reports should include lessons learned so that these can be shared with the Design team.

ONGOING ENERGY MONITORING

Energy reporting should take place annually by the building manager and reported within Helical's yearly Sustainability Performance Report.



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