REDUCE
THE WHOLE LIFE ENVIRONMENTAL IMPACT OF OUR CONSTRUCTION PROJECTS

EMBODIED CARBON
OPERATIONAL ENERGY
CIRCULAR ECONOMY

TARGETS AND KPIs

EMBODIED CARBON

2030 TARGET

625 $kgCO_2e/m^2$ (MODULES A-C)

Unite students want to reduce embodied carbon of their developments across the whole life 60 year period. This includes upfront (construction), in-use (refurbishment and replacement cycles and end of life impacts.

KPIs

- $kgCO_2e/m^2$ (modules A1-A5)
- Embodied Carbon intensity for:
  - Substructure
  - Superstructure
  - Envelope
  - Glazing
  - Internal Walls
  - Finishes
  - MEP

OPERATIONAL ENERGY

2030 TARGET

<35 kWh/m^2

Unite Students are following the residential EUI target set out by RIBA 2030 Climate Challenge, however this will be superseded with the UK NZC Buildings Standard when released.

KPIs

- % Onsite renewable energy generation
- U-values
- Air Tightness
- Glazing ratios (%)
- Form Factor

CIRCULAR ECONOMY

2030 TARGET

DEMATERIALISATION – kg*/m^2/60 YEARS

Our aim is to reduce the amount of materials we use in construction, particularly virgin material consumption. Our KPI is measures the total virgin technical material used per m^2 of our developments, which can be minimised by a number of CE principle including re-use/ refurbishment, bio-based materials, designing for adaptability and deconstruction.

KPIs

- Diversion from Landfill %
- Re-use, Recycling and Downcycling %
- Designing for Deconstruction %
- Bio-based / renewable materials %

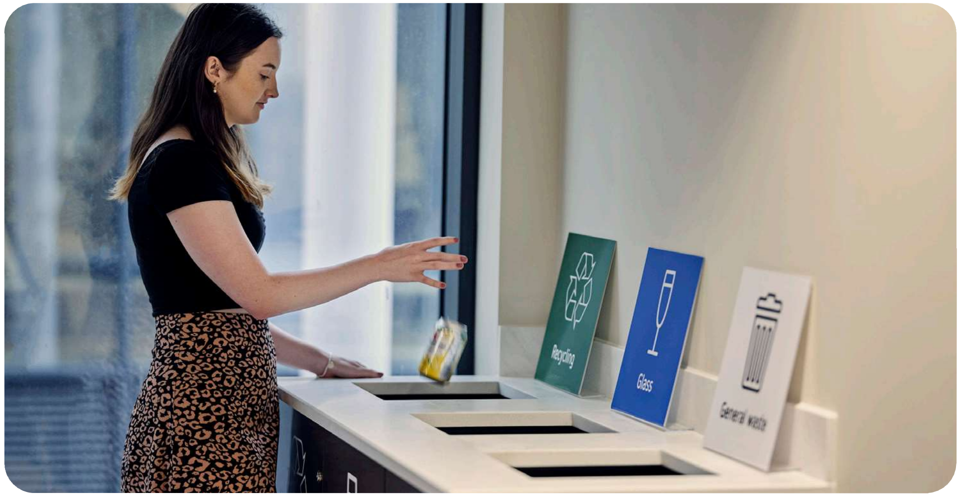
*virgin technical materials

EMBODIED CARBON APPROACH

Embodied Carbon Targets

As defined in the Unite Students Net Zero Carbon Pathway, our development pipeline will follow the embodied carbon targets outlined in the RIBA 2030 Climate Challenge. Interim annual targets will be derived for the developments with PC dates between 2025 and 2030

RIBA Sustainable Outcome metrics	Business as usual (new build, compliance approach)	2025 Targets	2030 Targets
Embodied Carbon $kgCO_2e/m^2$	1200 $kgCO_2e/m^2$	<800 $kgCO_2e/m^2$	<625 $kgCO_2e/m^2$



Approach

Unite students "currently" follow the approach to net zero carbon outlined with in the UKGBC Net Zero Carbon for Buildings A Framework Definition. However, we are currently tracking progress of the UK Net Zero Carbon Buildings Standard and will review our approach to net zero developments upon publication. In achieving net zero carbon in construction (embodied) we will first reduce our embodied carbon in line with the RIBA 2030 Climate Challenge targets, and then offset the residual carbon using an offset approach to be defined by the business.

1. **Set project targets in line with 2030 NZC aspiration**
2. **Reduce embodied carbon through design stages**
3. **Include NZC requirements within tender documentation**
4. **Verify post construction embodied carbon**
5. **Offset residual carbon emissions following uS offsetting guidelines (TBC)**

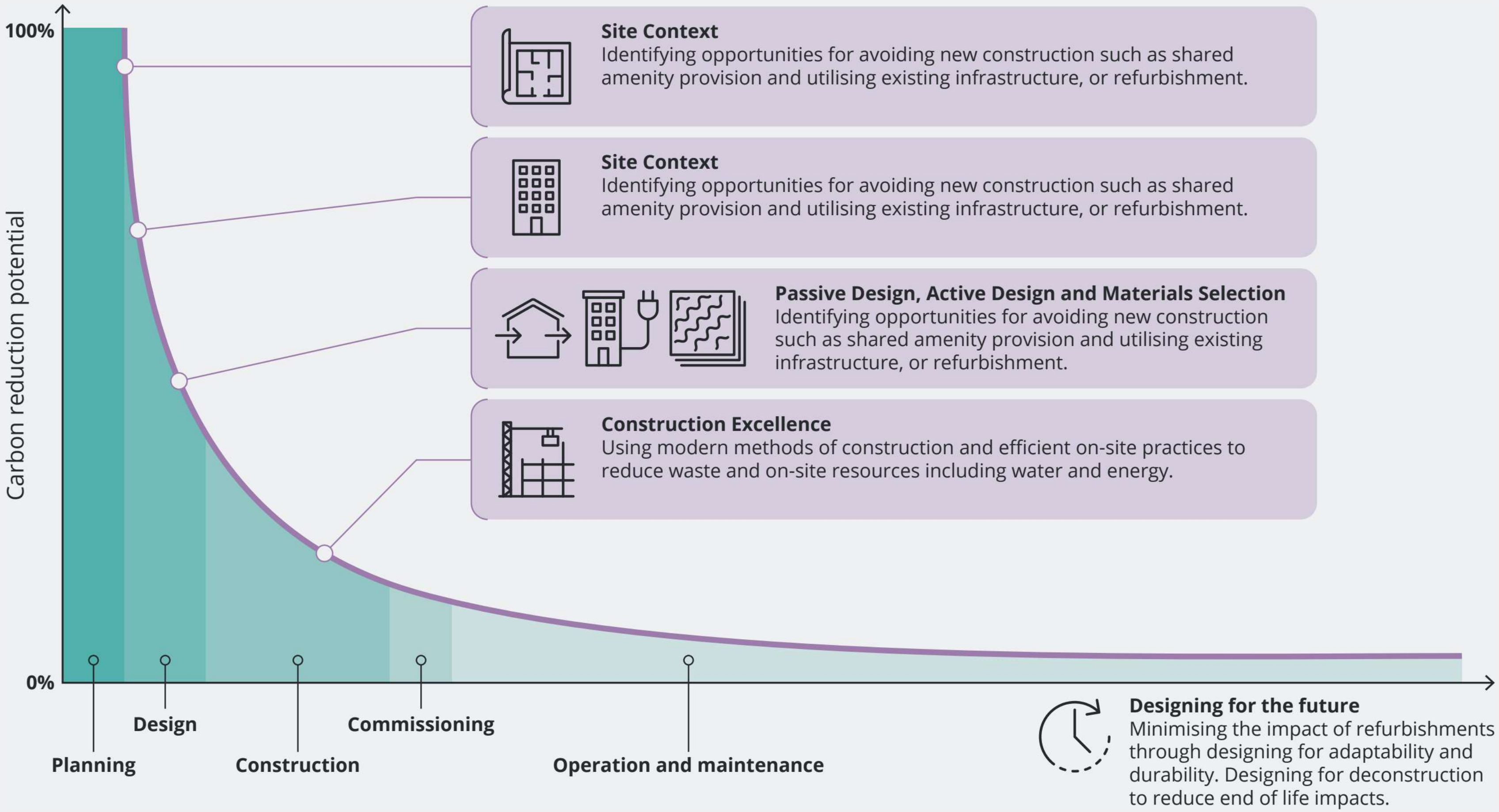
Next Steps

Conduct skills gap analysis of supply chain and continue to work alongside design teams and developers to embed Unite Students' Sustainable Construction Framework.

Development of Unite Student carbon offsetting and pricing principles. These will outline the criteria and carbon price that should be applied to embodied carbon offsets for our 2030 developments.

EMBODIED CARBON APPROACH (CONTINUED)

OPPORTUNITIES FOR CARBON REDUCTION THROUGH THE DEVELOPMENT LIFECYCLE



EMBODIED CARBON PERFORMANCE TIMELINE

DESIGN APPROACH

Current Spec

Structure: RC 0% GGBS
Façade: Brick Slip
Glazing: Aluminium Double Glazed
Internal Walls: Turnkey Spec
Finishes: Turnkey Spec
Building Services: Mixed mode - panel heaters

NZC Interim Spec

Structure: RC 25-70% GGBS
Façade: Brick Slip
Glazing: 70% Recycled Aluminium Double Glazed
Internal Walls: Turnkey Spec
Finishes: Turnkey Spec / Linoleum Flooring
Building Services: Mixed mode - panel heaters / wet systems

NZC Spec (TBC)

EMBODIED CARBON
LIFE CYCLE ANALYSIS MODELLING

Overview of One Click LCA Modelling

One Click LCA is a standardized, science-based tool for quantifying the lifecycle environmental impact of our buildings. LCA takes into consideration all the steps that lead from raw material through manufacture, distribution and usage to final disposal. Unite Students have committed to using One Click LCA software to ensure consistency and transparency across our projects and the industry.

In the construction sector conducting an LCA provides a number of tangible benefits:

Reduced environmental impact by:

- Evaluating building site options to select the lowest impact choice.
- Comparing the environmental impacts of renovating rather than demolishing and building anew.
- Comparing design alternatives to choose the lowest impact ones.
- Identifying a building's environmental hotspots and taking action to reduce them.
- Calculating the lifetime impact of building materials and products to help find the most sustainable option.

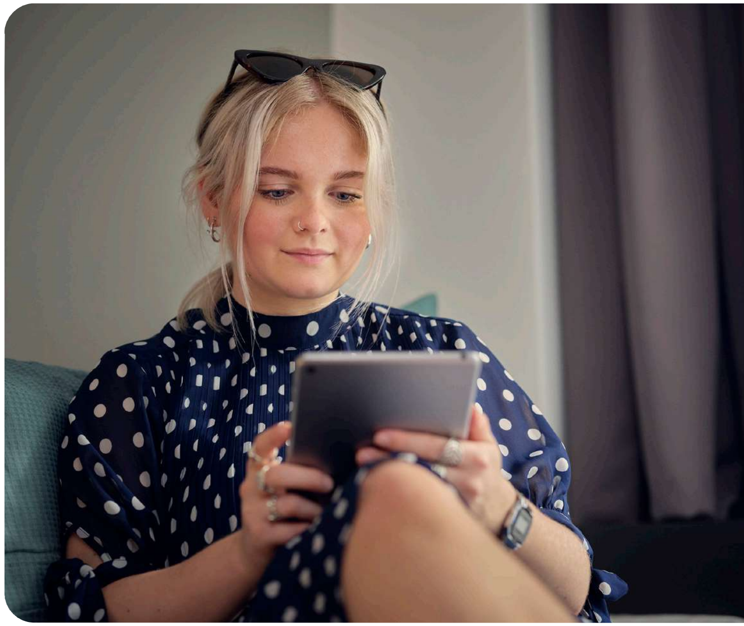
LCA Protocols Document

Unite Students have produced an LCA protocols document to ensure that the quality and consistency of our in-house and consultant LCA modelling practices. The protocols document ensures that the requirements of the RICS WLC methodology and the GLA WLC Statement are met on all projects. Finally, the protocols document ensures that all projects can be compared to the RIBA and LETI embodied carbon targets.

Materials Library

Unite Students have developed a materials library using One Click LCA. Our Turnkey specification has been modelled, alongside a range of net zero carbon options for design teams to review and update where optimisations have been identified. This collaborative approach across our projects will help to drive down embodied carbon across our current and future development pipeline.

One Click LCA



EMBODIED CARBON
LIFE CYCLE ANALYSIS MODELLING (CONTINUED)

RIBA STAGE APPROACH TO LCA MODELLING

	RIBA Stage 0/1	RIBA Stage 2	RIBA Stage 3/4	RIBA Stage 5	RIBA Stage 6/7
Responsible	Unite Students	Design Team • Architects • Structural Engineers	Design Team • Architects • Structural Engineers • MEP Engineers	Unite Students, Design Teams and Contractors	Unite Students and Design Teams
Tool	One Click LCA Carbon Designer	One Click LCA uS Materials Library	One Click LCA uS Materials Library	One Click LCA uS Materials Library	One Click LCA uS Materials Library
Design Information	Basic Building parameters	Revit: • Structural volumes • Envelope area • Internal wall areas Rule of thumb: • MEP • Finishes • FFE	Revit: • Structural volumes • Envelope area • Internal wall areas • MEP • Finishes • Landscape Schedule of FF&E	Contractor supplied as built quantities Stage 4 Revit model	Revit: • Structural volumes • Envelope area • Internal wall areas • MEP • Finishes • Landscape or Benchmarks for TK Spec where design information is limited
Outcomes	Establish high level embodied [estimate]	Compare elemental options including structures, envelope, internal walls and finishes where possible	Test component level embodied carbon limits Review rebar content and concrete strengths	Verification of final embodied carbon numbers for offsetting	Measurement of ongoing refurbishment and AMI projects

OPERATIONAL ENERGY PERFORMANCE APPROACH

Operational Energy Targets
As defined in the Unite Students Net Zero Carbon Pathway, our development pipeline will follow the operational energy targets outlined in the RIBA 2030 Climate Challenge.

RIBA Sustainable Outcome metrics	Business as usual (new build, compliance approach)	2025 Targets	2030 Targets
Operational Energy kWh/m^2/y	120 kWh/m^2/y	<60 kWh/m^2/y	<35 kWh/m^2/y

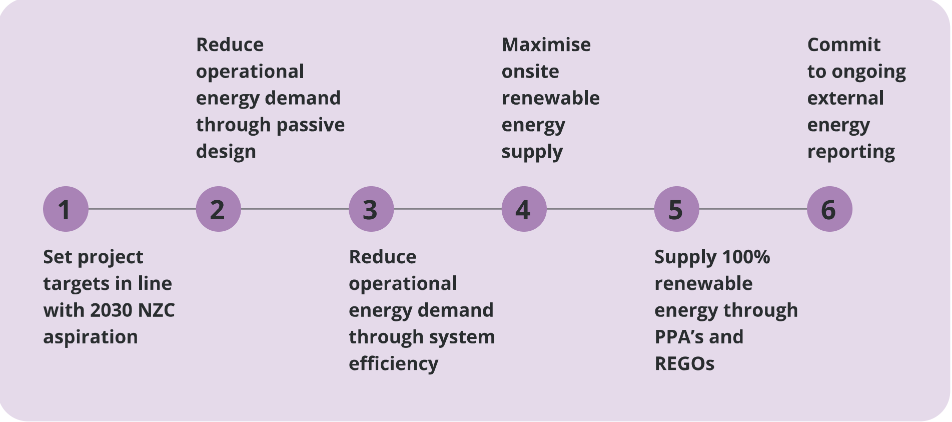
Approach
The approach used to reduce energy demand and consumption will vary between buildings dependent on its characteristics. Below is a list of the required by our design teams considerations:

- **Building fabric and passive design –** Reducing the overall energy demand required to operate the building. Improvements include efficient fabric and shading design to reduce heating and cooling demand, natural daylighting to reduce artificial lighting demand, natural ventilation to reduce HVAC demand, appropriate sizing of building systems to limit over-engineering.

- **Systems efficiency –** Increasing the energy efficiency of the building systems. Improvements include highly energy efficient building systems – HVAC, lighting, vertical transport etc.

- **Energy management –** Implementing smart energy/building management systems. Improvements include conducting an energy audit, managing occupant behaviour, managing 'peak loads', adjusting HVAC temperature set points, achieving ISO 50001 accreditation.

- **Further considerations –** The physical wellbeing of building occupants should be considered alongside energy reductions. These include considerations around indoor air quality, daylight and overheating. Additionally, as we develop our embodied carbon modelling of building systems including heat pumps and battery storage, we will make more integrated decisions around whole life carbon impacts.



Next Steps
We have identified PassivHaus and EnePhit as potential routes to meeting our 2030 energy performance target, and will be engaging with our design teams and contractors to understand the implications of pursuing these accreditations.

OPERATIONAL ENERGY PERFORMANCE APPROACH (CONTINUED)

APPROACH TO REDUCING OPERATIONAL ENERGY CONSUMPTION (ADAPTED FROM LETI: CLIMATE EMERGENCY DESIGN GUIDE)

1. **Active Systems**
The transition from gas boilers to high COP heat pumps producing c.3 units of energy per unit consumed.

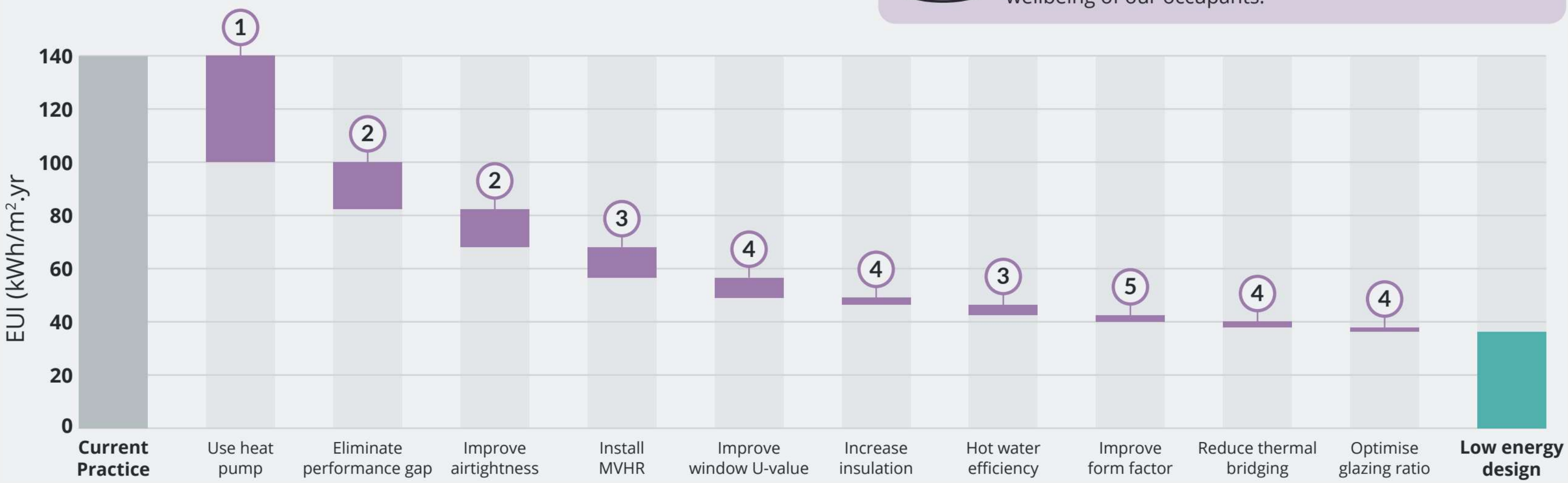
2. **Construction Excellence**
Reducing the performance gap through improving the quality of construction, commissioning and handover of the building.

3. **Active Systems**
Heat recovery and reducing system losses from heating, ventilation and hot water systems.

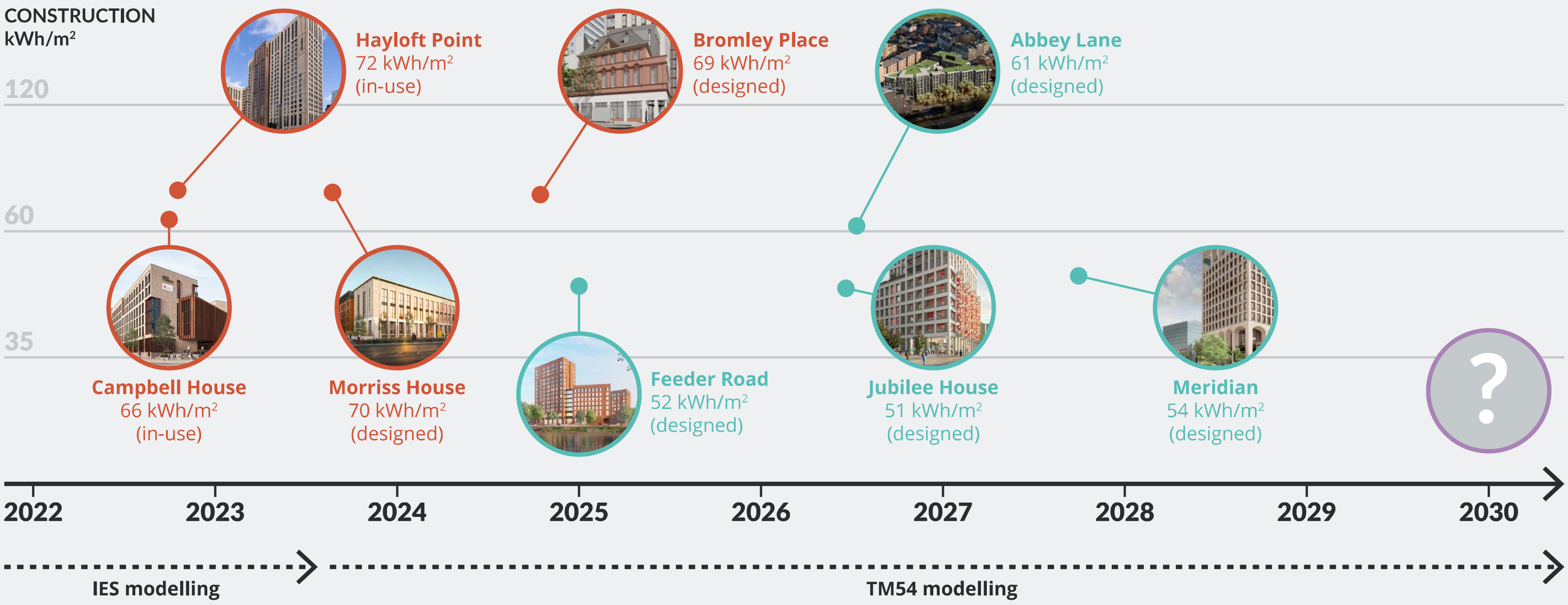
4. **Passive Design**
Reducing energy demand of the building through enhanced fabric performance, glazing and shading. Ensuring the building responds to its environmental conditions in terms of heat loss, solar gain and daylighting, with minimal intervention from active building systems.

5. **Efficient Form**
Reducing the heat loss from the building and minimising insulation required.

Human Centred Design
Underpinning all of the decisions made around building performance, is the thermal comfort and health and wellbeing of our occupants.



OPERATIONAL ENERGY PERFORMANCE TIMELINE



DESIGN

Current Spec
Fabric Performance: Exceeding Building Regs
Systems: ASHP/ Electric Panel Heaters

Interim Spec
Fabric Performance: LETI
Systems: ASHP/ Electric Panel Heaters

NZC Spec
Fabric Performance: LETI
Systems: TBC

OPERATIONAL ENERGY PERFORMANCE MODELLING

Overview of Energy Modelling

As energy performance legislation becomes more stringent, and we aspire to provide occupants with high levels of thermal comfort in a changing climate, it is necessary to better understand the way that our buildings behave.

Changes in building design and occupation affect the energy and thermal performance of buildings and building energy modelling enables a deeper understanding of the likely effects of these changes. Energy consumption and risk of overheating are particularly pertinent issues.

In new buildings, energy modelling should be carried out at an early stage of the design process in order to inform further development of the design and construction.

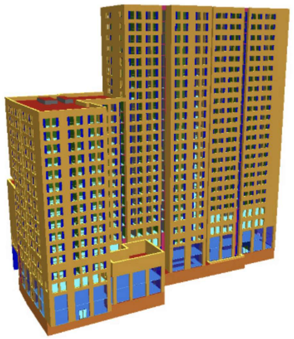
In existing buildings identified for refurbishment, modelling can help to evaluate and prioritise the options for reducing carbon emissions cost effectively.

To date Unite Students have been carrying out energy modelling for Part L requirements under Building Regulations using IES software. Whilst this tool has been used successfully to achieve compliance with planning and meet our baseline NZC targets, we acknowledge that Part L modelling is neither fit for purpose in terms of delivering energy performance requirements, nor reporting at design stage against real world energy consumption.

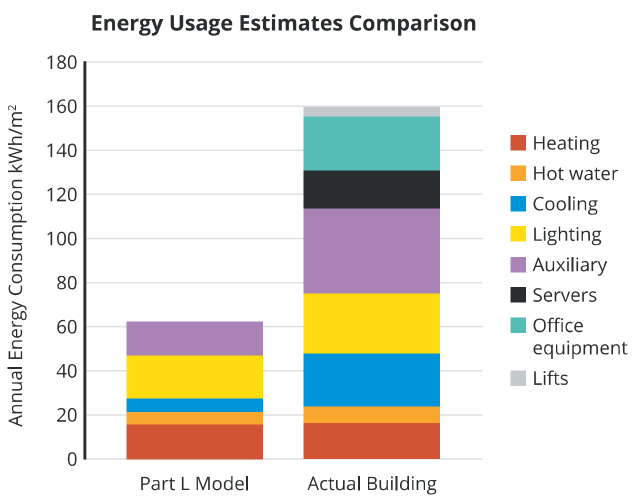
Next Steps

Over 2023 we will transition to reporting our operational energy performance at design stage against the TM54 Methodology. This is in line with the requirements of the GLA Whole Life Carbon Assessment and guidance from LETI.

Additionally we will include in our Employers requirements a commitment to early design stage environmental analysis in addition to Part L compliance modelling.



IES Energy Model: Hayloft Point



TM54 comparison with Part L – CIBSE

OPERATIONAL ENERGY PERFORMANCE MODELLING (CONTINUED)

RIBA STAGE APPROACH TO ENERGY MODELLING

	RIBA Stage 1	RIBA Stage 2	RIBA Stage 3/4	RIBA Stage 5	RIBA Stage 6/7
Responsible	Unite Students / Design Team	Design Team	Design Team	Contractor	Unite Students
Tool	Early stage modelling tool	IES Part L Modelling TM54 Methodology Early stage modelling tool	IES Part L Modelling TM54 Methodology	IES Part L Modelling	IES Part L Modelling TM54 Methodology
Outcomes	Test early design parameters including building orientation, massing and glazing ratios	Compliance with Part L building regs Identify optimisations to building fabric and systems TM54 model to provide compliance with Unite Students	Compliance with Part L building regs Detailed sensitivity testing of building fabric and services optimisations	Compliance with Part L building regs – discharge planning conditions	Ensure that EPC ratings remain up to date

CIRCULAR ECONOMY

Overview of the Circular Economy

The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

For Unite Students there are numerous potential benefits with the transition to a circular economy including material cost savings, reduced price volatility, improved security of supply, employment creation, as well as reduced environmental pressures and impacts. Circular economy thinking is long term planning. It must cut across all phases of project development, from design to delivery and use.

Next Steps

We have already identified industry leading circular economy metrics that we will be reporting against our development pipeline from 2023. The indicators that we have selected are relatively new within the industry, but reflect guidance from industry bodies including LETI and the UKGBC. We will produce a circular economy playbook to provide in-depth design and implementation guidance for our projects.

HOW ARE WE APPROACHING CIRCULAR ECONOMY

Designing for the Future

Spaces that are functionally, volumetrically and temporarily adaptable. Optimising the use of available floor spaces and building in future adaptability to the building services. Each building layer should be considered independently based on maintenance and replacement cycles to minimise the impact on other elements when works are required. Where new building elements will be introduced there will be the opportunity to disassemble them in the future to extract the maximum value, where feasible reusing the material in the same form, re-manufacturing, and dissembled to optimise material cycles.

Material Optimisation

Specifying out virgin technical materials by prioritizing low toxic, bio-based materials where replacements or new construction is required. Ensuring performance, durability and quality of materials specification. Where possible a move to leasing and/or adopting manufacturer take back schemes are pursued. This will re-focus material flows through the value chain, placing incentives for manufacturers to place materials in high value cycles.

Site Context

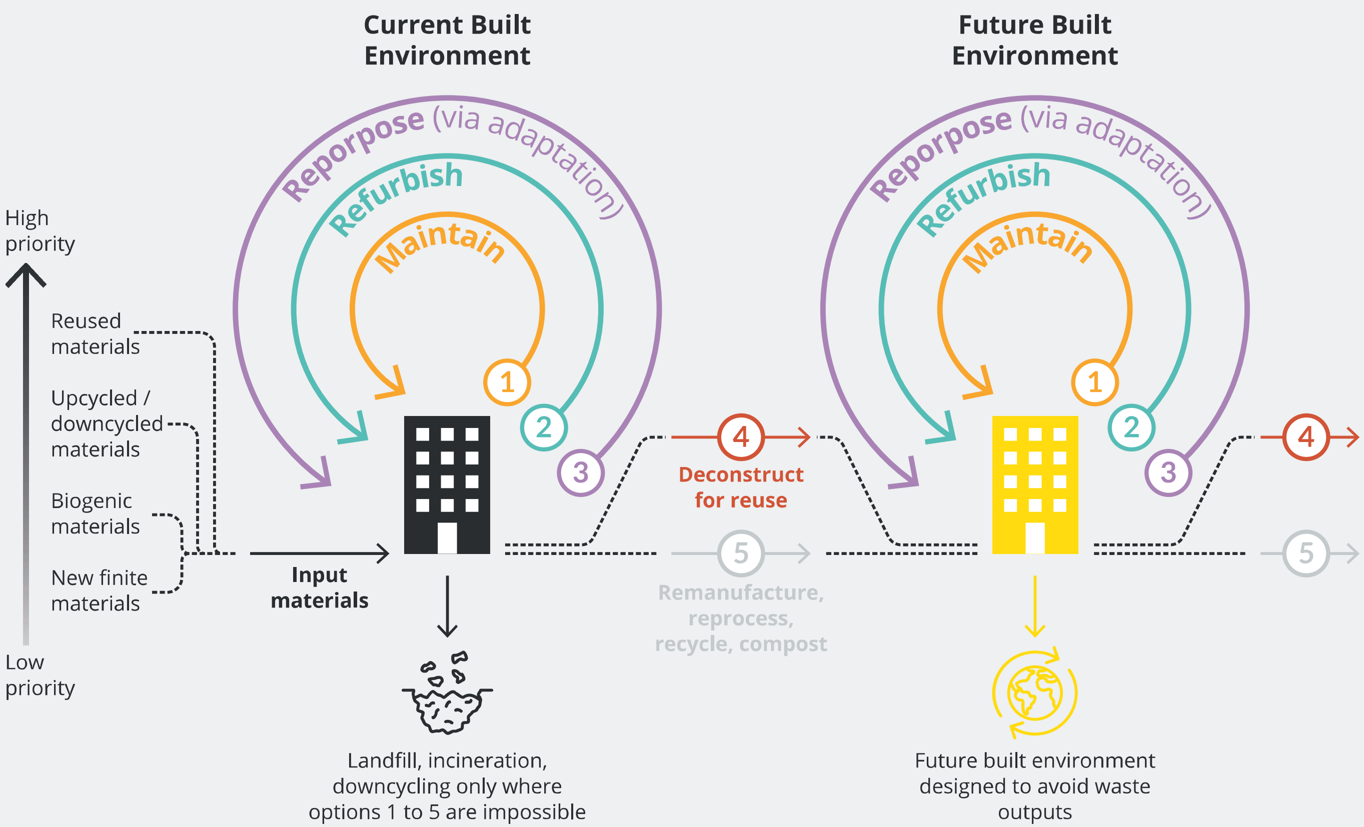
Retaining materials in situ, and/or re-using existing materials on site is our best opportunity to reduce material consumption across our developments. Identifying opportunities for refurbishment over new construction, or carrying out pre-demo audits and incorporating existing materials into schemes where new developments are required.

Efficient Form

This includes rationalising the level of intervention in the first instance. Additionally waste can be designed out through selecting products that can be manufactured with minimal waste byproducts and using standardised components and sizing.

CIRCULAR ECONOMY (CONTINUED)

CIRCULAR ECONOMY PRINCIPLES



DESIGNING IN LAYERS