Enabling the Delivery of New Net Zero Carbon Homes

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UK GBC

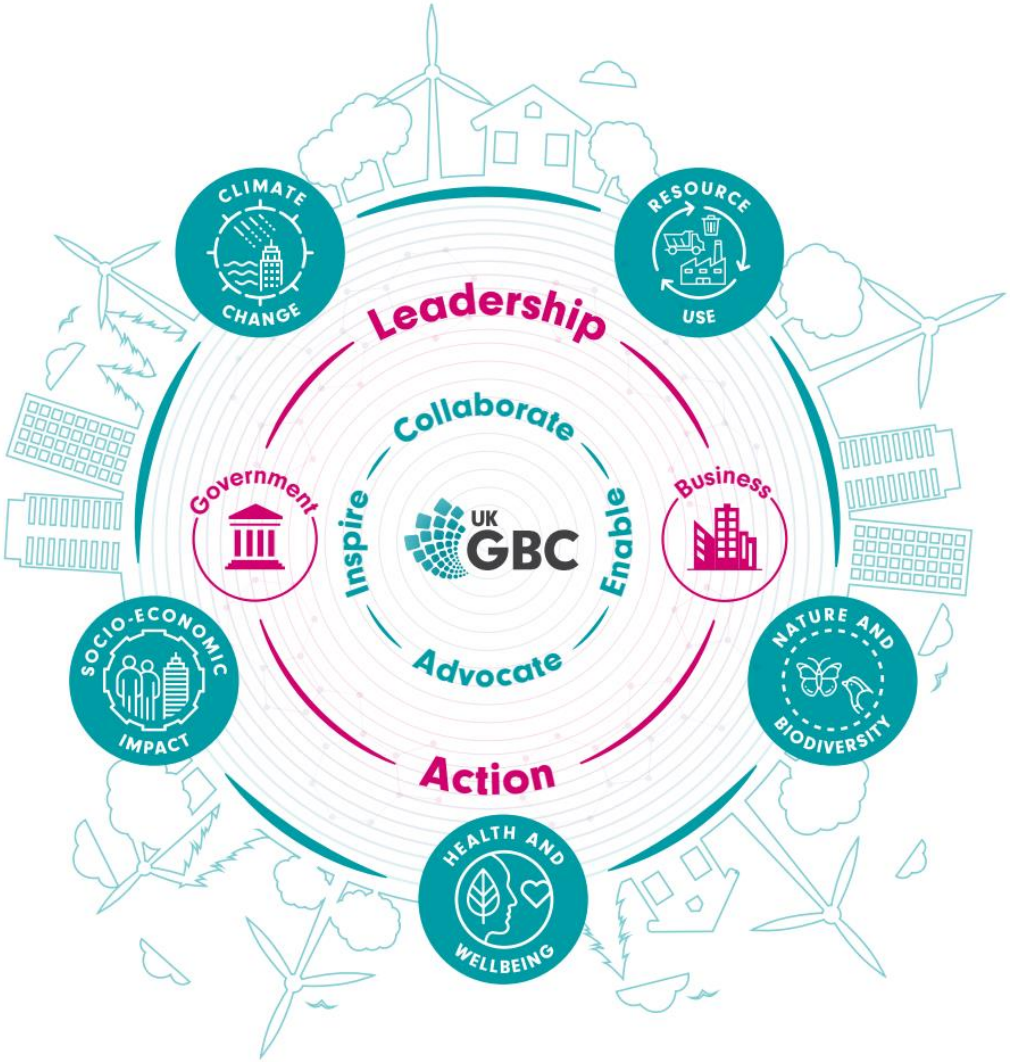

To radically improve the sustainability of the built environment, by transforming the way it is planned, designed, constructed, maintained and operated.
UK GBC

WE COLLABORATE by convening diverse built environment organisations to engag in a common purpose

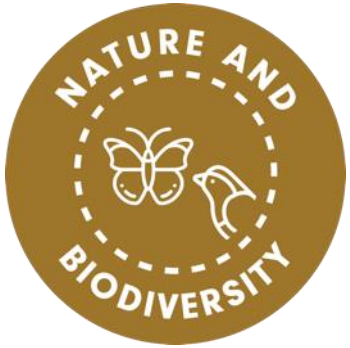
WE ADVOCATE by calling for ambitious commitments, stronger standards and progressive policy

WE ENABLE by developing guidance, showcasing solutions and stimulating innovation

WE INSPIRE by sharing knowledge and best practice, and encouraging transformational leadership



A built environment that enables people and planet to thrive



Advancing Net Zero

A World Green Building Council global project

WORLD GREEN BUILDING COUNCIL

WorldGBC definition:
A net zero carbon building is highly energy efficient with all remaining energy from on-site and/or off-site renewable sources

100% of buildings must operate at net zero carbon

2050

2030

All new buildings must operate at net zero carbon

GOVERNMENT ENGAGEMENT

TRAINING & EDUCATION

CORPORATE ENGAGEMENT

CERTIFICATION

Key Principles

1. Measure and disclose carbon
Carbon is the ultimate metric to track, and buildings must achieve an annual operational net zero carbon emissions balance based on metered data

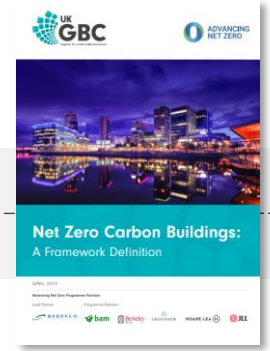
2. Reduce energy demand
Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy

3. Generate balance from renewables
Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets

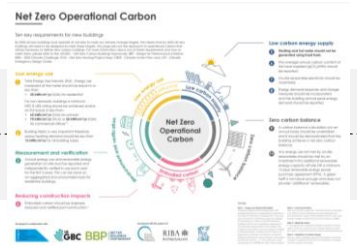
4. Improve verification and rigour
Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste

Version 1 | March 2018

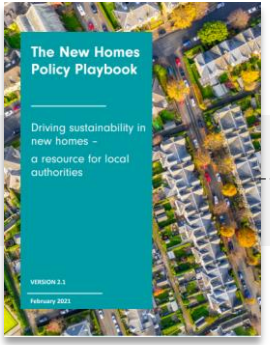
Enabling new net zero carbon homes: 2019-2022



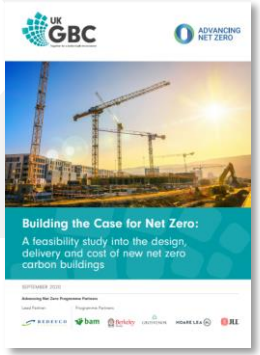
Apr 2019
Net Zero Carbon Buildings: A Framework Definition



Sept 2019
Net Zero Operational Carbon 1-pager

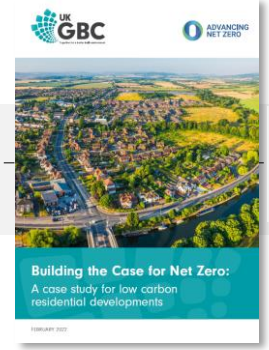


Jan 2021
New Homes Policy Playbook



Sep 2020
Building the Case: High-rise residential and office

Nov 2021
Net Zero Whole Life Carbon Roadmap



Feb 2022
Building the Case: Low-rise residential

1) Net Zero Carbon Buildings Framework Definition

Published in April 2019

Centred around three overarching principles:

1. Polluter pays
2. Improve measurement and transparency
3. Encourage action today and tighten requirements over time

2) Building the Case: High-rise residential

- Considered upfront carbon and operational energy
- Targets developed by industry bodies RIBA, LETI and UKGBC
- Key design changes:
  - Reduce glazing proportions
  - Install heat pump systems
  - Increase thermal performance of facades

Residential block – Legal & General

Results: Embodied and Operational Carbon

Table 4: Embodied carbon (module A; $kgCO_2e/m^2$)

	Baseline	Intermediate	Stretch
Target (excluding sequestration)	800 (LETI – business as usual)	500 (LETI – 2020 target)	300 (LETI – 2030 target)
Achieved (excluding sequestration)	**615** ✓	**500** ✓	**485** ✗
Achieved (including sequestration)	N/A (no timber used)	N/A (no timber used)	**315** ✗

Table 5: Operational energy (whole building; kWh/m^2 (GIA)/year)

	Baseline	Intermediate	Stretch
Target	**146** (RIBA – business as usual)	**70** (RIBA – 2025 target)	**35** (RIBA – 2030 target)
Achieved	**112** ✓	**63** ✓	**44** ✗

Results: Costs

Baseline **Intermediate** **Stretch**

3) Building the Case: Low carbon residential developments

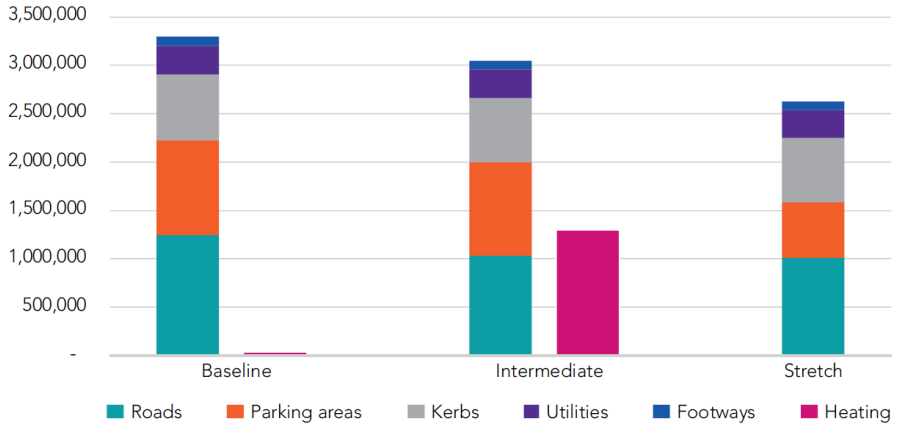
- Proposed new development in Southwest Cambridgeshire
- 750+ new homes
- Connectivity and active transport key to planning and design proposals
- Design changes focused on:
  - Roads and hard surfaces
  - Parking and landscaping
  - Heating

Trumpington South – Illustrative masterplan

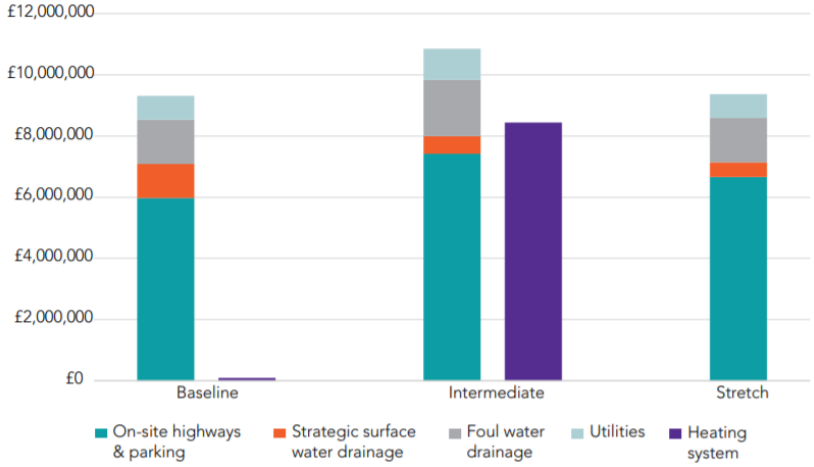
Results

*Overall **20.3%** reduction in embodied carbon for a **0.6%** capital cost uplift.*

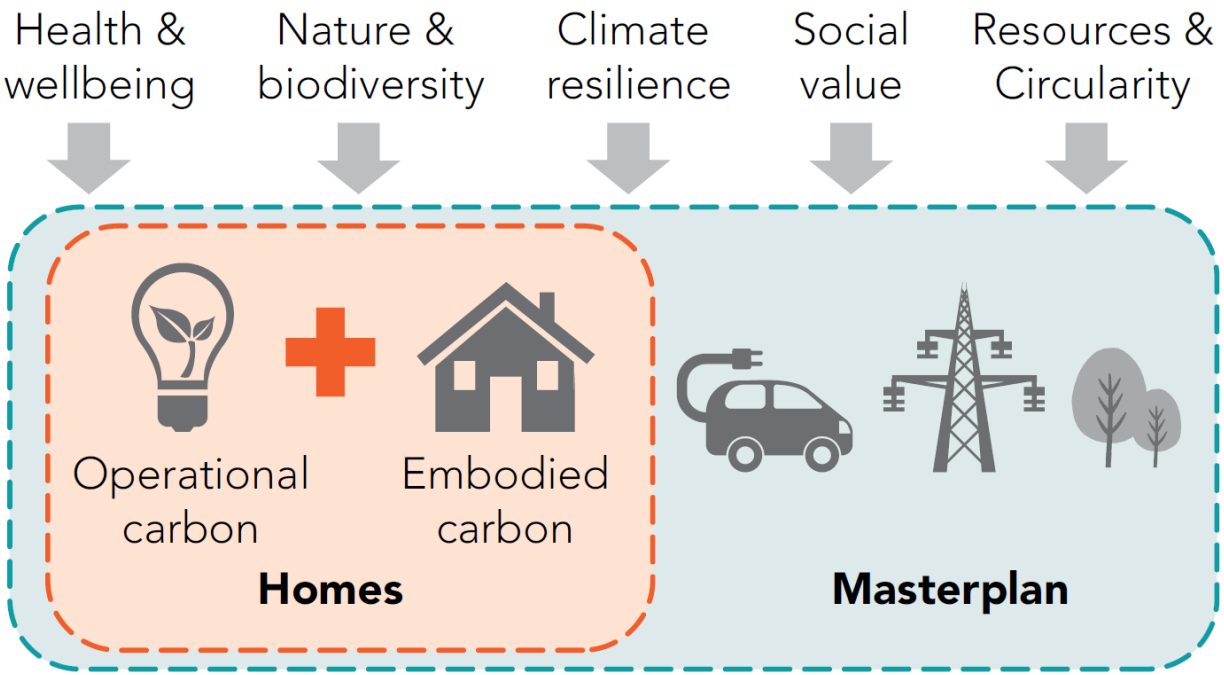
1) Embodied Carbon (kgCO2e) – Heating separated out



2) Costs (£) – Heating separated out



Low carbon masterplans and homes



4) Designing new net zero carbon homes

Design
→ Consider form factor, size, orientation

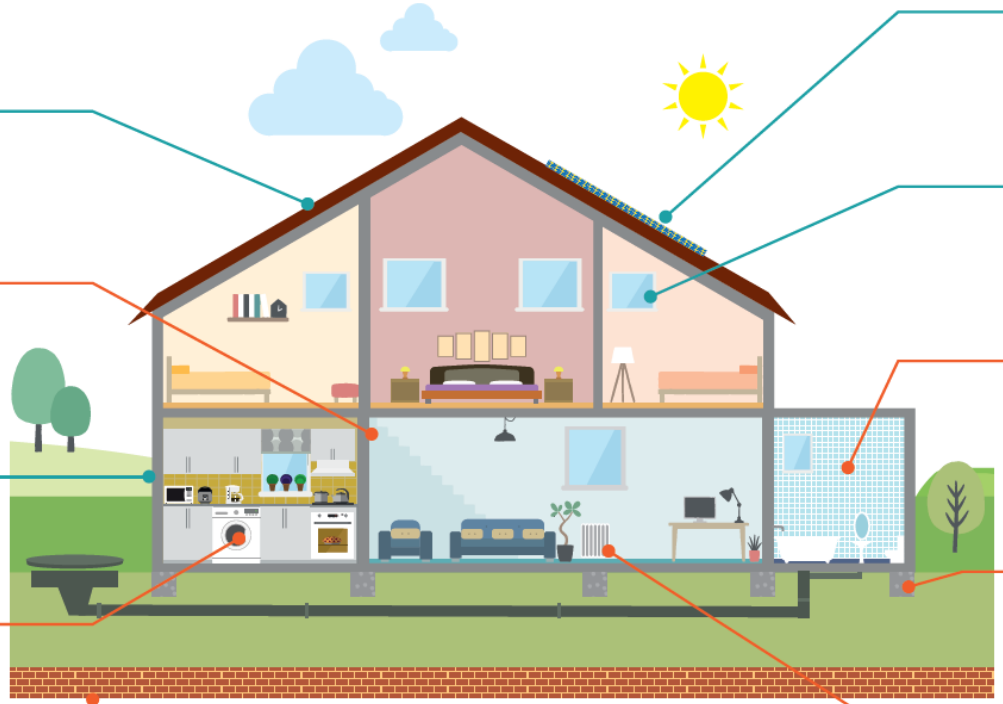
Roof
→ Improve U-values with low carbon insulation

Superstructure (58%)
E.g. frame, envelope floors, stairs
→ Use low-carbon material alternatives, consider off-site construction (prefabricated panels)

Building fabric
→ Improve wall U-values, air tightness levels and undertake detailed thermal bridge calculations

Fixtures and fittings (1%)
E.g. whitegoods, electronic equipment
→ Support occupants to make low carbon purchases

External works (7%)
E.g. boundary walls
→ Use low-carbon material alternatives



Building services
→ Passive design, high-efficiency systems, maximise renewables on-site, install smart controls

Windows
→ Install high-performance glazing balancing overheating and fabric energy efficiency

Finishes (5%)
E.g. plaster, paints
→ Minimise amount of finishes, use alternative low carbon materials and/or with recycled content

Substructure (18%)
E.g. foundations, footings
→ Use low carbon cement and concrete, and/or with recycled content

Building services (11%)
E.g. heating, ventilation, renewables
→ Minimise energy demand and install minimal services

Key:
Embodied carbon
Operational carbon

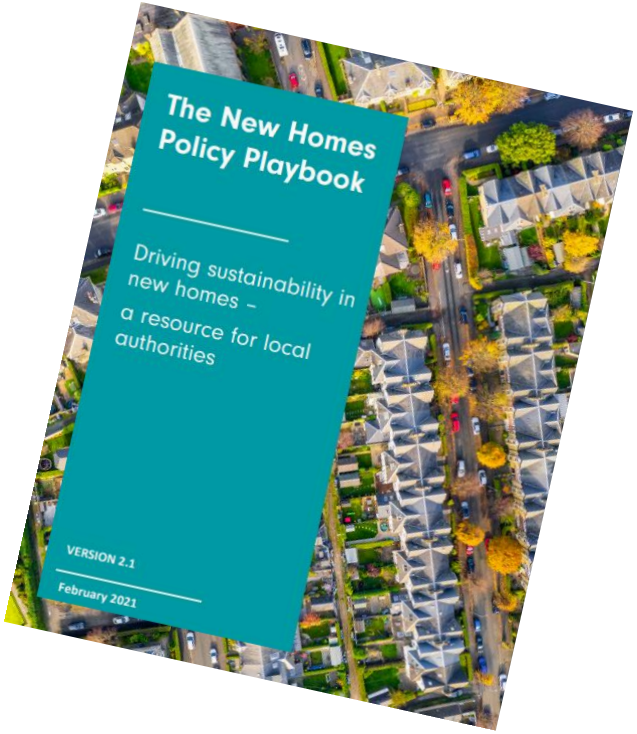
Steps to delivery

Design and construction	Handover	Operation
• Low embodied carbon • Low energy demand • High fabric standards • No fossil fuel combustion • Provide on-site renewables **Achieve 'net zero carbon – construction' at practical completion**	• As built testing and commissioning • High-quality renewable energy supply • Guidance for occupier use	• Energy performance monitoring • Maintenance and repair **Achieve 'net zero carbon – operational energy' on an annual basis**

See UKGBC's Net Zero Carbon Buildings Framework and supporting resources for further detail:
https://www.ukgbc.org/ukgbc-work/net-zero-carbon-buildings-framework/

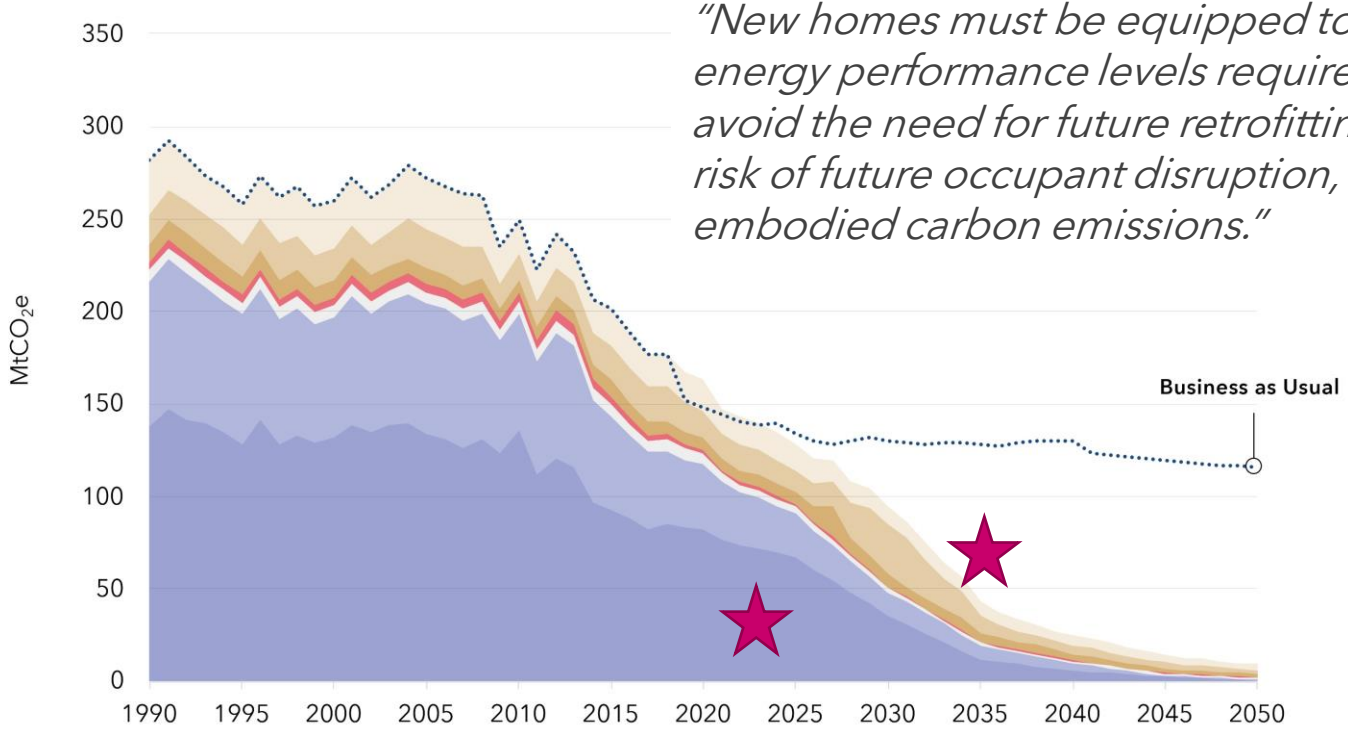
1) New Homes Policy Playbook

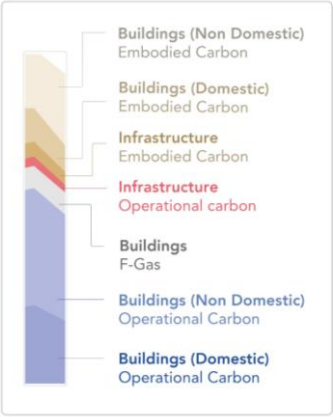
- Sets out **minimum** and **stretching** requirements for Local Authorities to drive sustainable new homes in their area - *all go beyond national policy*
- Requirements divided into:
  1. Reducing energy demand
  2. Reducing embodied carbon
  3. Measuring in-use performance
  4. Low carbon energy supply
  5. Zero carbon balance



2) Net Zero Whole Life Carbon Roadmap

"New homes must be equipped to deliver the energy performance levels required for net zero to avoid the need for future retrofitting and remove the risk of future occupant disruption, cost and embodied carbon emissions."





Turning momentum into action

- **Visit** https://www.ukgbc.org/ukgbc-work/advancing-net-zero/ for information on our resources
- **Read** the relevant Stakeholder Action Plan from the Whole Life Carbon Roadmap
- **Keep an eye out** on our Events & Courses webpage for upcoming webinars and workshops to help you understand your role in the net zero transition
- **Engage** in discussion with colleagues and relevant stakeholders to assess what we can do to create a sustainable built environment

Thank you

If you have any questions, please email ANZ@ukgbc.org