Environmental Impacts of Construction Projects

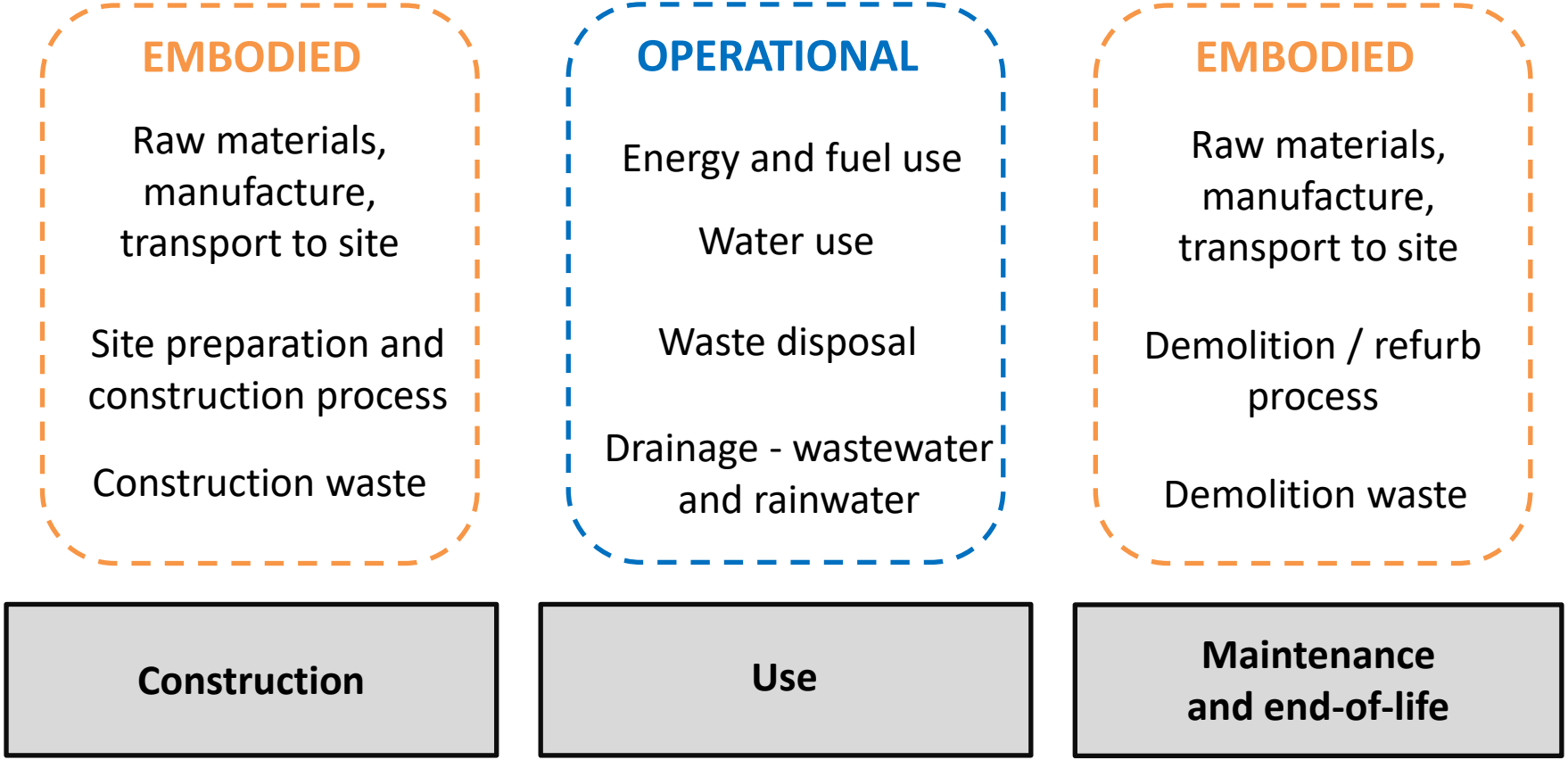
Overview Select Committee

24th September 2025

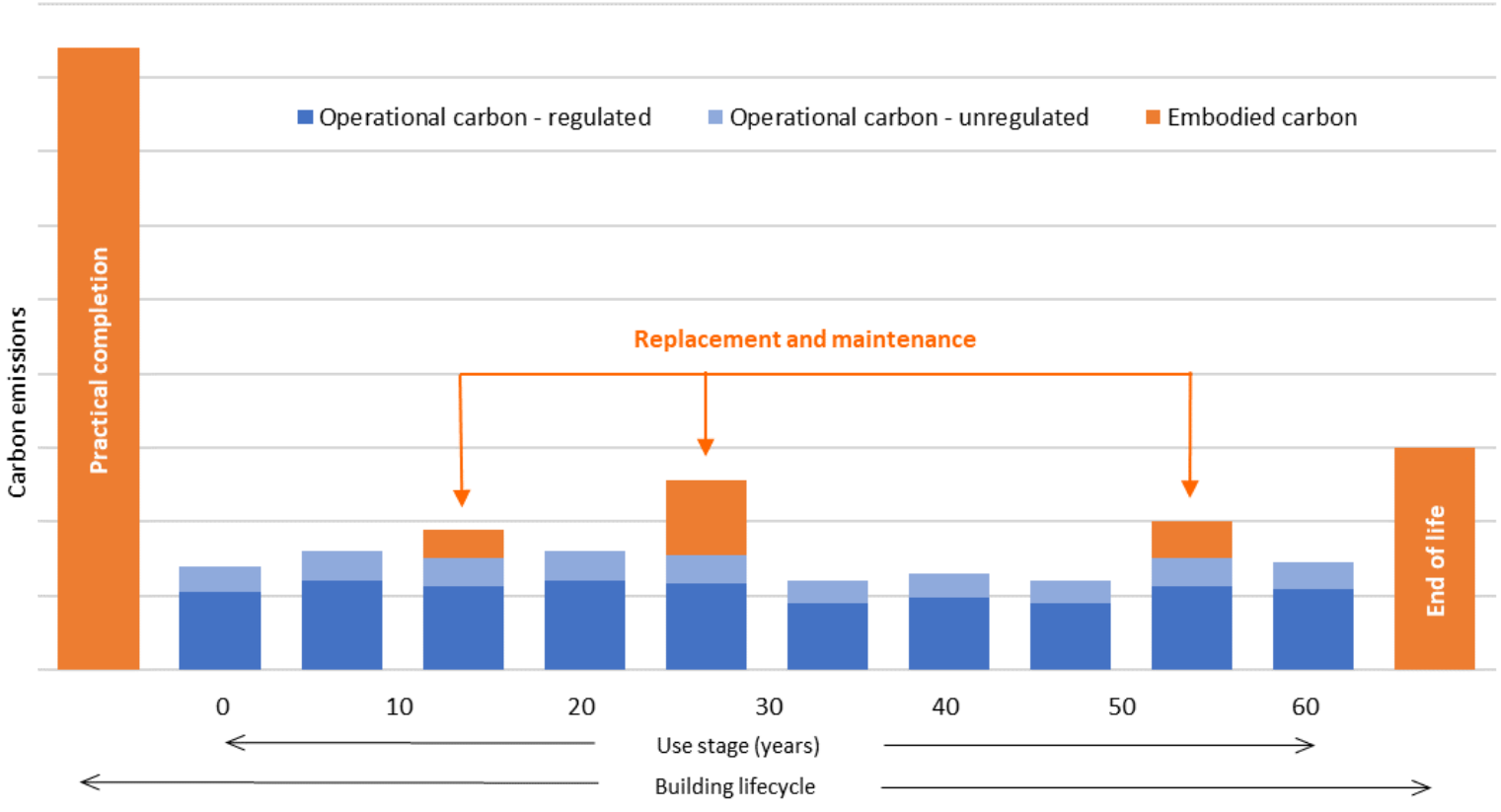
In this presentation we will:

1. Outline the main environmental impacts of construction, with a focus on carbon and energy
2. Outline the main legal and regulatory requirements
3. Set out the key features of a low carbon building
4. Present examples of what's being targeted and achieved in current council projects

Environmental impacts



Carbon emissions across the whole building lifecycle



Planning requirements

- National Planning Policy Framework
  - Development must support low carbon transition and climate adaptation
  - New devt. must reduce carbon, inc. through location, orientation, design and take account of opportunities to connect to heat networks and renewables
- Core Strategy
  - Energy efficient building - shape, orientation, insulation, airtightness
  - Energy efficient systems/fittings
  - Low carbon heat source
  - Renewables

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Building regulations

- Part L: Conservation of fuel and power (2021)
  - Target for carbon emissions
  - Minimum requirements for energy efficiency
- Part F - Ventilation
- Part O – Overheating
- Part S – EV chargers

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What makes a low carbon building?

Energy efficient and airtight building	Efficient heating and other systems – with no fossil fuel use	On-site renewables	Reduction of embodied carbon
Compact shape, orientated to benefit from solar gain	Efficient electric heating – usually heat pump* (or district heating connection). Good controls for heating	Roof mounted PVs where suitable roof area is available	Reuse of existing building where possible (or reuse of materials from demolition where not)
Well insulated, airtight	Mechanical ventilation with heat recovery (MVHR) Option of summer passive ventilation		Use of low carbon concrete and steel, reclaimed materials and materials with recycled content.
Good daylighting but avoids overheating	Energy efficient lighting - 100% LED. Good controls for lighting		Modelling of embodied carbon and setting of target based on a recognised benchmark figure.

* In a few building types, a heat pump may not be the most efficient low carbon option e.g. a warehouse.

Other climate issues in construction

- Water use
- Low carbon transport and accessibility
- Indoor comfort – including preventing overheating and maintaining indoor air quality
- Sustainable drainage
- Biodiversity

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Examples of current schemes

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St Margaret's Bus Station

St Margaret's Bus Station

Description	Redevelopment of bus station following strip-out and partial demolition of old bus station back to steel frame.
Operational carbon emissions	Net carbon positive due to electricity from PVs expected to exceed operational demand of building.
Operational energy demand	Achieved EPC of A+ due to PV output expected to exceed demand of building.
Lighting	Maximises natural daylighting through glazed concourse.
Heat/cooling and ventilation	No fossil fuel use. Electric radiant panel space heaters and electric water heaters.
Renewables	390 solar PV panels, generating approx. 142MWh electricity per year.
Embodied carbon	Retention of concrete foundations, apron, gutters and part of steel frame saved 575t carbon.
Other features	Bays for buses increased from 18 to 24 and electric bus charge-points included. Improved pedestrian and cycle access, plus secure storage for up to 100 cycles.

Dock 3-5

Dock 3-5

Description	4,000m^2 of new offices and 2,000m^2 of new industrial units
Operational carbon emissions	Net carbon negative for regulated emissions. 101% emissions reduction compared to Target Emissions Rate (TER).
Operational energy demand	PVs will generate slightly more renewable energy than buildings use (ex. plug loads, machinery used by tenants, ext. lighting, EV charge points).
Basic building energy efficiency	Highly insulated and airtight. Roof lights to increase daylighting. Orientated to optimise solar gain while minimising overheating risk.
Heat/cooling and ventilation	Air source heat pumps. Heat recovery from mechanical ventilation to meeting rooms, canteen and tea point.
Lighting	100% LEDs with movement and daylight sensors to turn off when spaces are empty, or daylight is sufficient.
Renewables	717m^2 PVs with peak generating capacity of 144kW.
Other features	8 EV charge points.

Phase 2 new council housing

Phase 2 new council housing

Description	93 new homes at Saffron Velodrome, Lanesborough Road, Hydra Walk, Rockingham Close, Austin Rise and Whitteney Drive.
Operational carbon emissions	More than 70% reduction of regulated emissions compared with Part L 2013.
Operational energy demand	Designed to be very low energy with EPC 'A' rating. Annual energy bills were estimated (at the time of the original design work in 2020) to be not much more than a third of an average household dual-fuel bill at the time.
Basic building energy efficiency	Highly insulated. Targeting low air permeability.
Heat/cooling and ventilation	Combined units incorporating air source heat pumps plus mechanical ventilation with heat recovery.
Lighting	High efficiency LED lighting throughout.
Renewables	PVs with approx. 1.5kW peak generating capacity per house, with up to 2kW for some homes.
Other	Targeting low water use of 110 litres per person per day (compares to 142 litres average)

Canopy


Coffee Bar
Workspace
Circulation
Storage
Exhibition Zone
1 Entrance Foyer & Collaboration Space
2 Small Coffee Bar

Canopy

Description	Refurbishment of approx. 5,800m^2 floorspace to create new rental offices, shared workspaces, café and reception.
Operational carbon emissions	Approx. 50% reduction of regulated operational carbon compared to pre-refurbishment.
Operational energy demand	Targeting EPC improvement from ‘D’ to ‘B’ rating. Will be nearly as efficient as a typical newbuild.
Basic building energy efficiency	Existing fabric being improved within constraints of protecting heritage value and retaining industrial character. Measures include roof insulation, secondary glazing, draft-proofing and low U-values for new glazing to atrium and cafe.
Heat/cooling and ventilation	Retaining connection to district heating for provision of space heating and hot water. Mechanical ventilation with heat recovery.
Lighting	High efficiency LED lighting throughout.
Renewables	Limited due to space requirements for other plant, as well as overshadowing of roof areas, but space found for some PVs.
Embodied carbon	Creation of new office space based on refurbishment of existing buildings is reducing embodied carbon substantially compared to newbuild.

Stocking Farm

Stocking Farm

Description	Exemplar low-carbon, social housing led regeneration scheme on land owned by the Council. 50 newbuild council homes and five refurbished units.
Operational carbon	More than 80% reduction compared with Building Regs. Part L 2021.
Operational energy	Designed to be ultra-low energy. Highly insulated, very low air permeability. Homes orientated to optimise solar gain while minimising overheating risk.
Heating & ventilation (newbuilds)	Air source heat pumps. Mechanical ventilation with 95% heat recovery.
Lighting	High efficiency LED lighting throughout.
Renewables	PVs with peak generating capacity of average 4kW per newbuild house. PVs also to be considered for refurbished maisonettes and farmhouse building.
Embodied carbon	Newbuild homes to be less than 625kgCO_2e/m^2 (RIBA 2030 Climate Challenge target). Existing maisonettes and farmhouse building being retained and refurbished to reduce use of new materials. Demolition waste segregation for potential reuse.
Other features	6 EV charge points, public bike parking for 38 bikes; water saving target of 95 litres per person per day (meets RIBA Climate Challenge target for 2025); new community green space.

Recent PV arrays by EBS, Capital Projects

Recent PV arrays by EBS, Capital Projects

Project	Est. energy generation	Est. carbon saving	Est. energy cost saving	Investment
Aylestone Leisure Centre Roof replacement and PVs. 828 panels, 3600m^2	270MWh pa	~55tCO^{2}e pa	£65,000 pa Est. 9-year payback	50% ERDF - £598k 50% LCC - £598k
Newarke Street Car Park 198 panels, 360m^2 Steel canopy mounted. Technical challenges overcome.	67MWh pa	12tCO^{2}e pa	Up to £24,500 pa. Est. 6-year payback	45% ERDF - £122k 55% LCC - £149k
Leycroft Road Depot 267 panels across 4 buildings.	~70MWh pa	Over 31tCO^{2}e pa	£12,400 pa. Est. 5-year payback	33% ERDF - £31k 67% LCC - £64k

Towards Climate Ready construction

- Council default approach is now highly energy efficient and fossil-fuel free, with PVs in most cases
- Aspirational standards identified to work towards – addressing operational and embodied carbon
- Assessing the learning from current schemes – costs, market readiness, in-use performance
- New Local Plan policy and Future Homes and Building Standards will push up standards for all development

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