Appendix 4 – Policy X D – Embodied Carbon and Waste

4.1 Embodied carbon refers to the emissions associated with materials and construction processes throughout the whole lifecycle of a building or infrastructure. Embodied carbon is an important aspect to consider as it represents the total greenhouse gas emissions from the entire life cycle of a building's materials, ranging from extraction and manufacturing to transport, construction, maintenance and disposal.

4.2 The case for addressing embodied carbon is justified by the increasing proportional importance of these emissions as a share of buildings' total carbon footprint as the power grid is decarbonised and buildings become more energy-efficient. Unlike operational carbon emissions, embodied carbon has front-loaded impacts as the carbon is released before a building is even first used or occupied. Additionally, once materials are made and installed their emissions are permanent, so it is important to consider embodied carbon at the earliest opportunity.

Policy X D - Embodied Carbon and Waste

Residential and non-residential buildings (thresholds given below) must meet the followings requirements:

D1 – Embodied Carbon Reporting

1) All major new residential (10 dwellings or more) and non-residential (1000m^2 of floorspace or more) developments are required to complete a whole-life carbon assessment in accordance with *RICS Whole Life Carbon Assessment* guidance.

D2 – Limiting Embodied Carbon

2) All large-scale major development (100 dwellings or more; 5000m^2 or more of non-residential floorspace) is required to limit embodied carbon (RICS/BS 15978 modules A1-A5) to 600kgCO_2e/m^2 GIA.

D3 – Building End-of-Life

3) All new buildings should be designed to enable easy material re-use and disassembly, subsequently reducing the need for end-of-life demolition.

D4 – Demolition Audits

4) All major development that contains existing buildings/structures to carry out a pre-development and/or pre-demolition audit, following a well-established industry best practice method (e.g BRE) in accordance with the policy on 'reducing carbon emissions in existing buildings'.

D5 - Embodied Carbon in Non-Major Development

5) Proposals for new development of 1 or more homes or less than 100m^2 of non-residential floorspace, but below the size thresholds for embodied carbon reporting and targets as noted above, should include proportionate narrative on options

considered (and where possible, decisions made) to minimise embodied carbon of the proposed development.

Reasoned Justification:

4.3 Whilst there is no explicit reference to embodied carbon in the NPPF, the NPPF references to 'low carbon development' and 'low carbon economy' could readily include embodied carbon as an implicit part of this. The NPPF also sets out that the full range of potential climate change impacts should be taken into account when preparing and assessing planning applications. Additionally, embodied carbon can be considered as a design issue and therefore would fall under the NPPF's instruction that new development should be planned for in ways that help to reduce greenhouse gas emissions, such as through its design.

4.4 By addressing embodied carbon and promoting sustainable construction practices, this policy could deliver a range of co-benefits that extend beyond carbon reduction, supporting wider economic, environmental, and social goals. This policy seeks to ensure that carbon emissions are limited across the whole life cycle of a building. Without this policy, large amounts of carbon emissions could be missed, given that up to 50% of a building's lifetime carbon emissions result from upfront embodied carbon[1].

4.5 The requirement for whole-life carbon assessments under D1 ensures that all major developments assess and mitigate the full carbon impact of building materials and construction. By limiting embodied carbon in large-scale developments (e.g., to 600 kgCO2e/m2 GIA), D2 plays an important role in reducing the carbon impact of large-scale major construction.

4.6 By promoting circular economy principles (particularly within D3 and D4) which focus on material reuse and the ease of disassembly at the end of a building's life, the policy encourages more resource-efficient construction, reducing waste generation and lowering costs of future demolition and disposal. Designing buildings for disassembly and material reuse helps reduce dependency on raw materials and limits costs related to sourcing and transporting new materials. By designing for disassembly and material re-use (D3), new buildings will be more adaptable and future-proofed, capable of being modified, extended, or dismantled with lower environmental impact. This leads to greater building longevity and flexibility, enabling spaces to evolve without the need for significant new construction.

4.7 The requirement for demolition audits under D4 ensures that before any building is demolished, the potential for reusing or recycling materials is thoroughly assessed. This reduces the amount of waste sent to landfill and encourages the repurposing of valuable construction materials.

4.8 The requirement to provide a narrative on embodied carbon for smaller developments (D5) encourages development of all scales to consider sustainable construction methods and communicate their choices to foster greater awareness and engagement with sustainable practices.

[1] https://www.arup.com/globalassets/downloads/insights/net-zero-buildings-halving-construction-missions-today.pdf

4.9 Compliance with D1, D2 and D3 are to be demonstrated within an energy statement. If applicable, output reports for D4 should be submitted alongside an energy statement.

4.10 With regards to D3, to ensure buildings can be adapted or dismantled at the end of their life, developers should focus on modular design using dry construction methods (e.g., bolts, screws) to enable easy disassembly. Avoiding permanent adhesives and welds allows materials to be reused or recycled efficiently. Material selection is also important. Low-embodied-carbon materials like timber or recycled steel are preferred for ease of reuse. Designs should prioritise durable, long-lasting materials and incorporate a reuse strategy for managing materials at the building's end of life, including deconstruction and sorting for recycling or reuse.

4.11 With regards to D5, it is t is recognised that the level of detail required will vary depending on the size and scale of the development. Applicants should provide a proportionate narrative in their energy statement, exploring how embodied carbon has been minimised. While detailed assessments are not required for smaller developments, the following considerations are encouraged:

- Incorporating and repurposing on-site materials or features where possible.
- Designing with a focus on reducing material use, such as through space-efficient layouts or structural design.
- Opting for materials with lower embodied carbon, such as timber, instead of higher-carbon materials like steel, aluminium, or conventional cement.
- Reducing 'product miles' by sourcing materials closer to the site or from manufacturers with demonstrated low-carbon practices.
- Implementing processes that reduce material wastage during construction

4.12 This approach ensures that applicants, even for smaller developments, are considering embodied carbon in a meaningful way, fostering sustainable practices without imposing excessive burdens on projects that do not meet the higher thresholds for formal reporting.