Whole-life carbon: RIBA and RICS guidance

By Simon Sturgis | 12 March 2018

Guidance from both RICS and the RIBA on carbon reduction from a whole-life perspective can be used together to plan for resource efficiency and minimal emissions. Simon Sturgis of Sturgis Carbon Profiling reports

Low carbon CLT internal structure of Dalston Lane residential scheme, east London, designed by Waugh Thistleton

Source: Daniel Shearing

01 / Introduction

The RIBA has just released guidance on carbon reduction called Embodied and whole-life carbon assessment for architects (by the same author as this article), available from the RIBA website. This is parallel guidance to the RICS' Professional Statement on the same subject released in November 2017 (Whole-life carbon assessment for the built environment – RICS 2017). The RICS Professional Statement is aligned with the Standard BS EN 15978, and provides a detailed methodology for assessing embodied and whole-life carbon for the built environment. A Professional Statement is the highest form of RICS guidance and is both mandatory (for RICS members undertaking carbon assessments) and regulated by the RICS.

These two documents can be seen to work together, with the RICS document providing a detailed explanation of whole-life carbon assessment methodology, and the RIBA document providing a summary of the RICS document plus an explanation of how to deliver embodied and whole-life carbon reductions through the RIBA stages.

Whole-life carbon emissions are directly related to the type and quantity of the resources used to create, maintain and use a building. This means that whole-life assessments are as much about resource efficiency as they are about carbon emissions . This makes whole-life assessments extremely relevant to tackling two key relevant environmental problems: global warming and resource depletion.

The aim of both the RIBA and the RICS guidance is to ensure that these assessments can be done in a reliable and consistent fashion, thus encouraging wider take up and reporting, leading to actions to reduce these negative environmental consequences.

Long-life facade of the same scheme – the carbon cost of the bricks can be justified by their very high durability

Source: Daniel Shearing

02 / The RICS and RIBA guidance

Assessing whole-life emissions has been problematic despite the common standard BS EN 15978 – 2011. This standard sets out an excellent structure for whole-life carbon emissions assessment, but leaves many issues open to individual client or consultant interpretation. This has led to inconsistent and unreliable reporting and the consequent inability to benchmark, set targets or gather reliable data.

The RICS Professional Statement provides a detailed methodology that should reduce these inconsistencies and enable robust and reliable assessment and reporting and encourage take-up across the industry.

The RIBA Guidance, however, is more explanatory than technical and is intended to introduce whole life thinking to architects and others and explain how this will lead to better buildings.

Implicit within whole-life assessment is lifecycle analysis, which requires, at the design stages, long-term, post-practical completion thinking by the project team. This includes future demolition and disposal and can also include the assessment of scenarios for future circular economic benefits. This of course links back to the issue of resource depletion mentioned earlier. Further, to minimise embodied emissions the project team needs to fully understand the sourcing, transport and fabrication of materials and components, as well as their durability, demountability, and ultimate disposal.

These seemingly peripheral issues can have significant carbon emissions and design consequences. For example, choosing between an anodised or a powder-coated finish for aluminium may seem principally an issue of colour, visual texture, durability and cost. However, the choice can have a direct impact on whether or not virgin aluminium (anodised) or recycled aluminium (powder coated) can be used in the new aluminium sections and sheets. Further, what the implications of each finish for both the sourcing and ultimate disposal of the aluminium are, and the consequent whole life carbon costs of each respective choice. In many cases, where this sort of choice is being made, the low-carbon option can also be the low-cost option.

The implications of a whole life approach to carbon emissions will have a number of important consequences. To date the MEP engineer is seen as the manager of energy and carbon emissions when designing a new building. However, if the majority (see RICS Professional Statement, p3) of lifetime emissions are generated by the choice of materials, their replacement lifecycle and their ultimate disposal of the fabric of the building, then there is a strong case for the architect, as principle designer, taking over the role of being responsible for project energy and carbon management, with input from the structural and MEP engineers.

Three references that explain whole-life carbon, its measurement, the methodology, application through the RIBA Stages, and case studies:

RIBA Guidance (2018)

Embodied and whole-life carbon assessment for architects

Available from the RIBA website

RICS Professional Statement (2017)

Whole-life carbon assessment for the built environment

Available from the RICS website

Targeting Zero (2017)

Embodied and whole-life carbon explained

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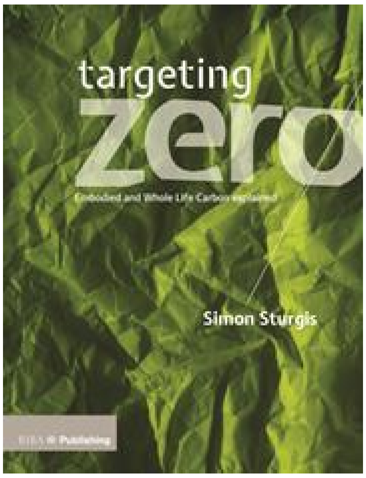
Available from RIBA Publishing



03 / Delivery

The RIBA guidance includes advice on how to undertake a whole-life carbon assessment (referencing the RICS document), and how this is delivered through the RIBA stages. The RIBA guidance provides a summary of the key issues starting with the factors influencing the assessment, such as spatial boundaries, physical characteristics, issues of measurement, data sources and so on. It then explains the background standard (EN15978) and takes you through the lifecycle modules.

In order to deliver a building that is truly low carbon from a whole life perspective, it is important that this thinking is included from the outset through all the RIBA stages. The RIBA guidance sets this out on a stage by stage basis. The fundamental requirement is that the client buys into the idea of whole life assessments. As noted above, the RICS Professional Statement is mandatory for RICS members, provided they decide to do a carbon assessment. BREEAM 2018 will require a lifecycle assessment, including embodied carbon. (The details of the new Mat01 will be confirmed when BREEAM 2018 is issued in April.) Therefore, it is reasonable to assume that if you wish to comply with BREEAM 2018, and your client is an RICS member, the WLC assessment will have to comply with both BREEAM and the requirements of the RICS Professional Statement.

In practice, the base RICS mandatory requirement will be quite similar to BREEAM in scope (although, for example, substructure will not be included in BREEAM but is with RICS). It is likely therefore that architects will have, as a minimum, to follow these base requirements. However, the mandatory base requirement of the RICS document is less than a full whole life carbon assessment, which is where the real benefits lie. The reason for this approach was to provide an "entry level" or "learning" form of assessment that would not deter engagement by project teams. The real value to design teams is not so much crunching through the numbers as understanding the detailed implications whole life thinking has on the design process. The benefits of the whole life approach, as outlined above, include a more efficient use of resources for both construction and over a building's life, as well as buildings whose future life is more carefully considered. Together these represent reduced costs, and a more valuable asset over time.

So, assuming client and team engagement with whole-life carbon assessment are agreed at RIBA Stages 0 and 1, then the first real action is required during Stage 2: concept design. It is here that the team needs to start to think about lifecycle issues such as climate change impacts; the durability and future flexibility of the building; its design life; the type of materials to be used; and future deconstruction and disposal or reuse. The type of environmental systems, how they work with the building skin, and what sort of replacement cycles both systems require are all relevant.

For Stages 3 and 4, detailed carbon assessments of actual materials and systems proposed would be brought together into a carbon budget. This would be expressed as $kgCO2e/m^2$, similar to the way in which construction costs are expressed (£/m^2).

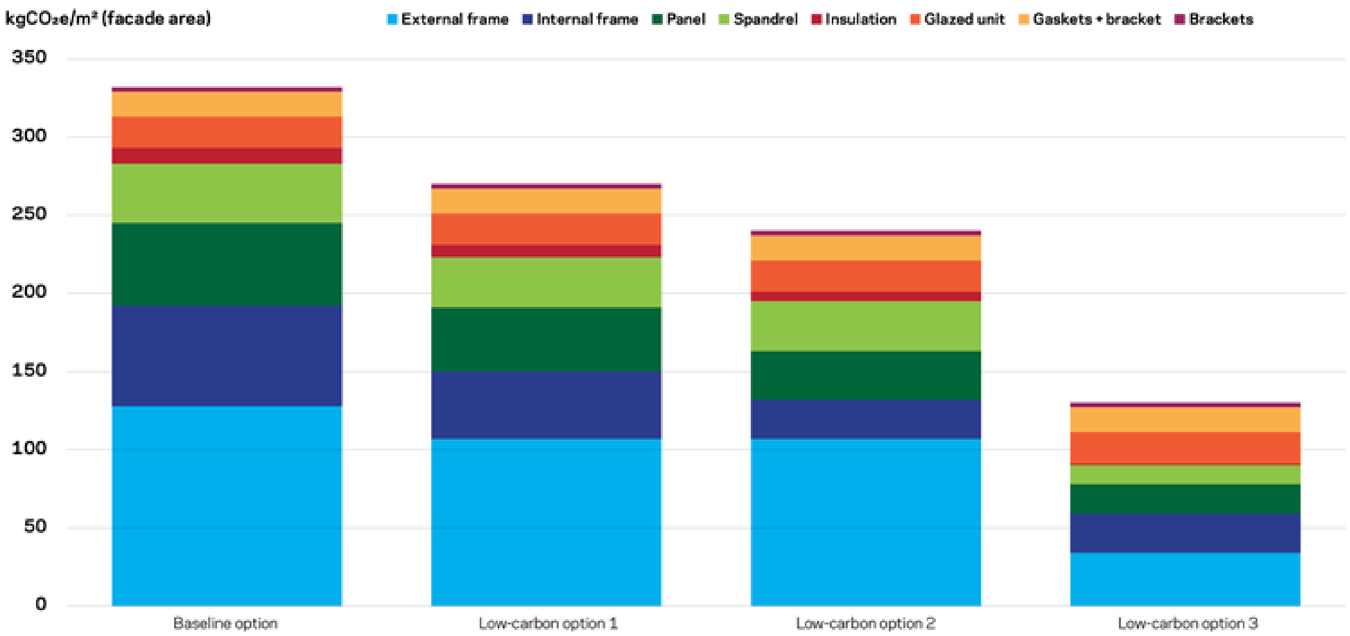
Combining the carbon cost of construction with both the lifecycle embodied carbon costs and the in-use operational carbon costs, gives you the whole-life carbon cost of the project. This carbon intensity figure is useful for tracking progress, and for comparisons with other projects. The selection of materials, and the design of systems should also include the potential for end-of-life, future reuse, and circular economic opportunities of what is proposed. The low carbon choices made can be included within the tender documentation, with any specific requirements of the contractor or the supply chain made plain.

It is sensible to engage with the contractor early so they understand the requirements of low carbon thinking, and how they can contribute. Stages 5 and 6, construction and close out would ideally be monitored to confirm that tender stage requirements are being met with a final post-completion assessment for review against the original carbon budget. Stage 7, post occupancy evaluation should expand to include a review of the fabric and its durability and maintenance regimes.

Figure 2: Working example of low carbon design options for a cladding panel

	Spandrel (external)	Panel (internal)	Insulation	Internal frame	External frame
Baseline option	Rolled aluminium 0% recycled content Finish: anodised	Rolled aluminium 33% recycled content Finish: PPC	PIR 120mm (spandrel) 96mm (panel)	Extruded aluminium 33% recycled content Finish: PPC	Extruded aluminium 33% recycled content Finish: anodised
Low-carbon option 1	Rolled aluminium 33% recycled content Finish: anodised	Rolled aluminium 70% recycled content Finish: PPC	Polyurethane 120mm (spandrel) 96mm (panel)	Extruded aluminium 70% recycled content Finish: PPC	Extruded aluminium 50% recycled content Finish: anodised
Low-carbon option 2	Rolled aluminium 33% recycled content Finish: anodised	Rolled aluminium 100% recycled content Finish: PPC	Phenolic foam 120mm (spandrel) 96mm (panel)	Extruded aluminium 100% recycled content Finish: PPC	Extruded aluminium 50% recycled content Finish: anodised
Low-carbon option 3	Rolled aluminium 100% recycled content Finish: PPC	VMZ zinc composite	Mineral wool 120mm (spandrel) 96mm (panel)	Extruded aluminium 100% recycled content Finish: PPC	Extruded aluminium 100% recycled content Finish: PPC

Total embodied carbon fabrication costs of the architect's baseline design choices against low- carbon options. In practice the options for the different components can be brought together in different combinations. Project: Sumner Street for Landsec



04 / Conclusion

The Paris agreement of 2015, together with the UK's own legal requirements mean that the downward pressure on all carbon emissions will only increase. The guidance provided by both the RIBA and the RICS enables the built environment industry to meet or even get ahead of these pressures.

The logic is both environmental and economic. The environmental case includes an expansion of carbon reduction opportunities by including the significant impacts from materials and construction, as well as avoiding unintended consequences by focusing on operational emissions alone.

The economic benefits include a closer understanding of the sourcing of materials from the supply chain, and a greater focus on lifecycle issues such as durability, reuse and circular economic benefits, which can surely only add value.