SCORS at four: what can we learn from the Structural Awards?

Will Arnold, Mike Cook, Duncan Cox, Orlando Gibbons and John Orr reflect on progress made around carbon targets over the past four years.

What is SCORS?

In 2020, the authors proposed a Structural Carbon Rating Scheme (SCORS)[1], informed by real-world embodied carbon data, that could be used to assess carbon design decisions and options. We analysed 300 projects' worth of data from the UK, and proposed a SCORS sticker **(Figure 1)** that assigned different ratings based on the upfront carbon of a structure (super- plus sub-). Rating bands were set at 50kgCO_2e/m^2 GIA (gross internal area) intervals, and business-as-usual (in 2020) was estimated to be an E rating based on the data reviewed.

A back-of-envelope attempt to compare emissions to a 1.5°C trajectory indicated that by 2025 the average structure being designed should be achieving a C rating, and by 2030 buildings' structures should be meeting an A rating. Examples presented in our original article suggested that an A rating was feasible even in 2020.

SCORS was quickly adopted by the structural engineering community. Its simplicity helped demonstrate the difference between 'low-carbon' and 'high-carbon' projects, and the goal of needing to achieve an A rating by 2030 proved an incentive to many. We started to see SCORS embedded in engineers' project write-ups, in organisations' carbon calculators, and in Structural Awards entries. The Institution embedded SCORS into The Structural Carbon Tool (TSCT; www.istructe.org/the-structural-carbon-tool/), and spin-off rating schemes emerged, including one for bridges ('SCORBS')[2], and another for offshore wind foundations[3] (though 'SCORSOWF' was rejected as an acronym!).

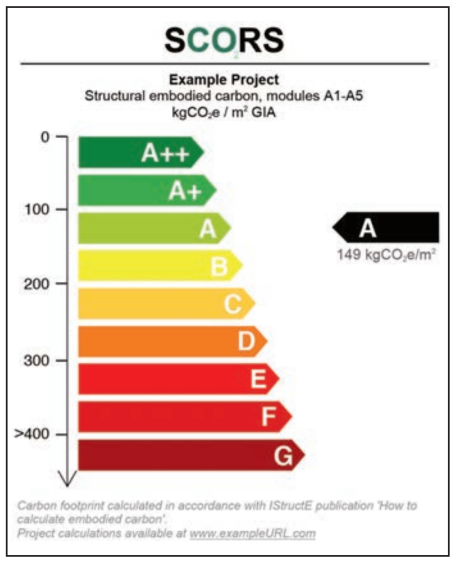


FIGURE 1: SCORS rating sticker

Four years later

Since the proposal of SCORS in 2020, a lot has changed in the world of embodied carbon calculations. The RICS updated its Professional Standard on whole-life carbon accounting in late 2023, leading to the Institution preparing a third edition of *How to calculate embodied carbon*[4] (HTCEC v3) and TSCT v3.0 in late 2024. The UK construction industry has also recently launched a Net Zero Carbon Buildings Standard (NZCBS; www.nzcbuildings.co.uk/). Embodied carbon legislation has now been passed into law across the EU (coming in from 2028) and several USA states, is in development in New Zealand, and continues to be called for at a regulatory level in the UK (having been adopted by several local authorities already).

This has also all been reflected in the changing role of the structural engineer – whose job is now to act as guardian of material use and carbon emissions, as much as guardian of life safety. This shift was reflected in the all-member sustainability skills survey of 2023, which showed that 53% of the Institution's members now consider themselves to be competent at calculating embodied carbon, compared with just 16% in 2018.

With change occurring at such great place, we must ask the following questions:

1) Is it now time to revisit and update SCORS?
2) Is the industry getting any better at reducing carbon?
3) What do we consider 'normal' in 2024?

The first question is easy to answer: no, there is no need to update the SCORS sticker. Its simplicity has been its strength, and tweaking the numbers on the sticker will hardly result in a reimagining of the way we design our projects. We are convinced that SCORS in its current format remains as easy to use, and as important to use, as when we first proposed it.

However, to maintain consistency with the use of SCORS, it is important to clarify the requirements for embodied carbon calculations that claim any SCORS rating. The calculation must follow the guidance provided in HTCEC v3 (or whichever version was the most recent at the time of rating), and it must meet minimum scope requirements for life cycle modules and building elements. For life cycle modules, this means A0–A5 (upfront carbon) must be calculated, and in terms of building elements, the upfront carbon must be quantified for:

- building elements listed in Table 2.1 of HTCEC v3 that are also in your project's scope of works
- materials that enable the structure to meet its performance requirements and enable like-for-like comparisons with other structural designs: fire protection (treatment or encapsulation of structural elements), acoustic insulation, vibration damping, blinding, temporary formwork and permanent formwork. See HTCEC v3, Table 2.4 for rule-of-thumb allowances for these elements in early design stages.

Questions 2 and 3 are much harder to answer. To understand whether we are decarbonising at all would mean having access to consistent embodied carbon data for projects designed in the years leading up to both 2020 and 2024. The updates to the RICS Professional Standard (and subsequently the latest versions of the Institution's guidance) anecdotally add 10–20% to a design compared with the 2017 version – carbon that was just not accounted for previously.

Projects are probably not becoming higher-carbon in themselves, but additional sources of carbon are being identified today as the industry improves its approach to embodied carbon calculations. Examples of this range from a better understanding of demolition and transport emissions to a more consistent approach to reporting items like screeds or steel connections.

We can be confident that the industry is at the very least talking about reducing embodied carbon more than ever before, as the topic gains more traction and some planning authorities have requirements to show whole-life carbon assessment (WLCA) results and evidence of plans to reduce carbon emissions in order to gain planning permission.

Even if we can't spot any trends yet, we can still ask what 'normal' looks like, based on the best data currently available.

The Structural Awards

Since 2022, entry to the Structural Awards has required the submission of an embodied carbon calculation for the whole structure entered. These are not peer-reviewed, and so the numbers can only ever help judges understand how projects compare on an order-of-magnitude basis. However, judges have reported finding the assessments to be useful in understanding the carbon-efficiency of designs.

Noting that these projects were all completed during the periods 2021–23, and therefore mostly designed before SCORS was ever proposed, this can hardly answer our questions around progress; however, it does give us an insight as to how our industry was performing when we were designing at the end of the previous decade.

Figures 2 and 3 show a summary of all projects submitted to the awards across the past three years, comparing shortlists and all entries. Such graphs were not produced until after shortlisting (though the carbon calculations themselves were available to judges), but it is notable that many of the highest-carbon projects were rejected by judges. In fact, in one year, two buildings actually made it onto the shortlist, only to be removed again after judges realised that the engineers were self-reporting unusually high upfront carbon emissions for each building, without justification of the societal value that was being delivered in return for such a high carbon footprint.

Whether high-carbon projects would fail to be shortlisted even without calculations is up for debate; some will argue that a skilled structural engineer can spot an inefficient design a mile away. But regardless of this, the story of these two rejected projects reinforces the need to consider carbon during design, and the gap between shortlisted and non-shortlisted projects reminds us that structural engineers celebrate efficiency over muscularity.

The data from the Structural Awards tells us a few more things. First, it indicates that while refurbishment projects are generally lower-carbon than new-build, this is not always the case, with some refurbishment projects receiving a G rating. This shows that even once a retrofit agenda has been established, embodied carbon must still be designed out, if we are to benefit from the potential that existing buildings offer.

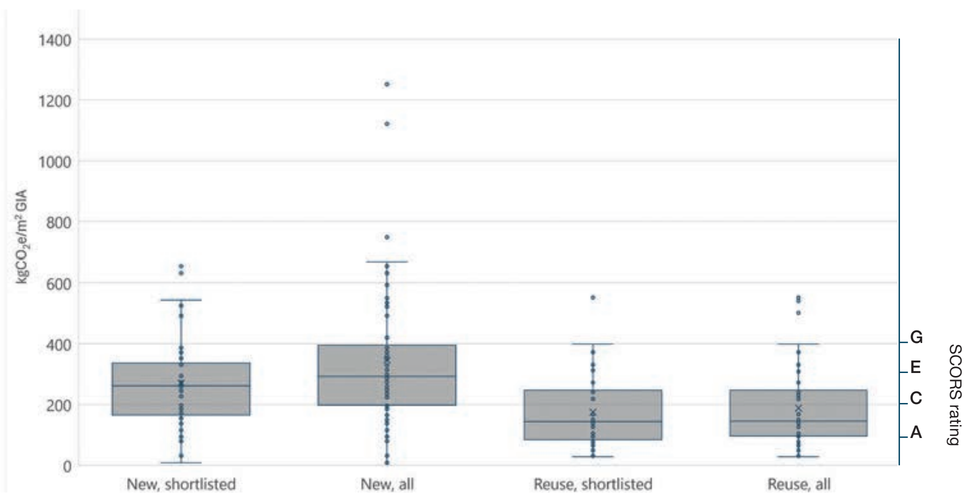
Second, we've had to treat stadia separately from other buildings – plotting in this article on the same axes as bridges, rather than buildings. This is unsurprising given the large spans, loading and dynamic requirements involved, and perhaps suggests that GIA is not an appropriate carbon emissions normalisation metric for stadia – number of seats or visitor hours could be better.

Finally, and most optimistically, it demonstrates that SCORS A ratings are achievable today even on new-build projects, all using materials and design methods from the past decade. These new-build projects all use low-carbon materials such as timber, avoid the use of structural gymnastics and deep basements, and prioritise sustainability as a key part of the brief. We should take encouragement from this and aspire to achieve such greatness on every project.

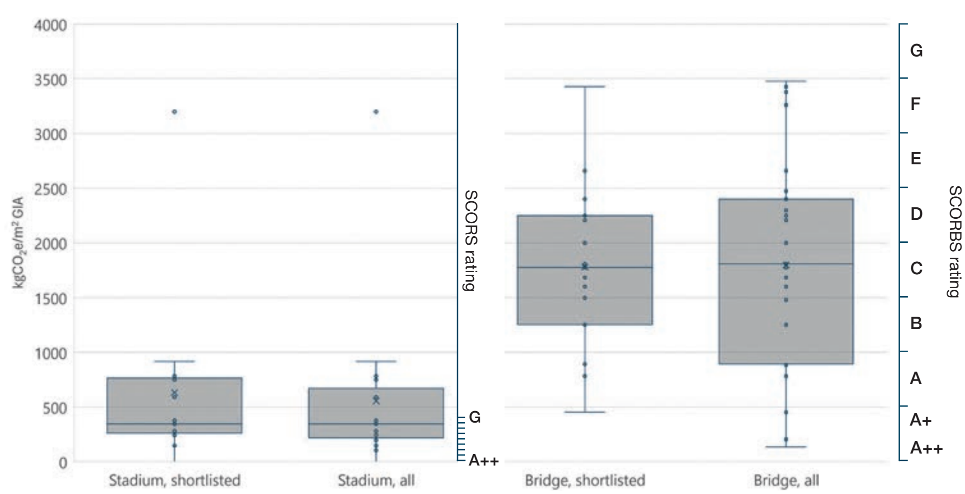
What is next?

We cannot yet demonstrate whether our designs are becoming lower-carbon. In fact, our numbers have probably risen in the last couple of years as the industry has improved at assessing carbon. That aside, the data that the Institution has collected through the Structural Awards already demonstrates the potential to design in far lower-carbon ways than most 'average' projects, and gives us a reason to aspire to achieve A ratings both on individual projects, and across our firms' portfolios.

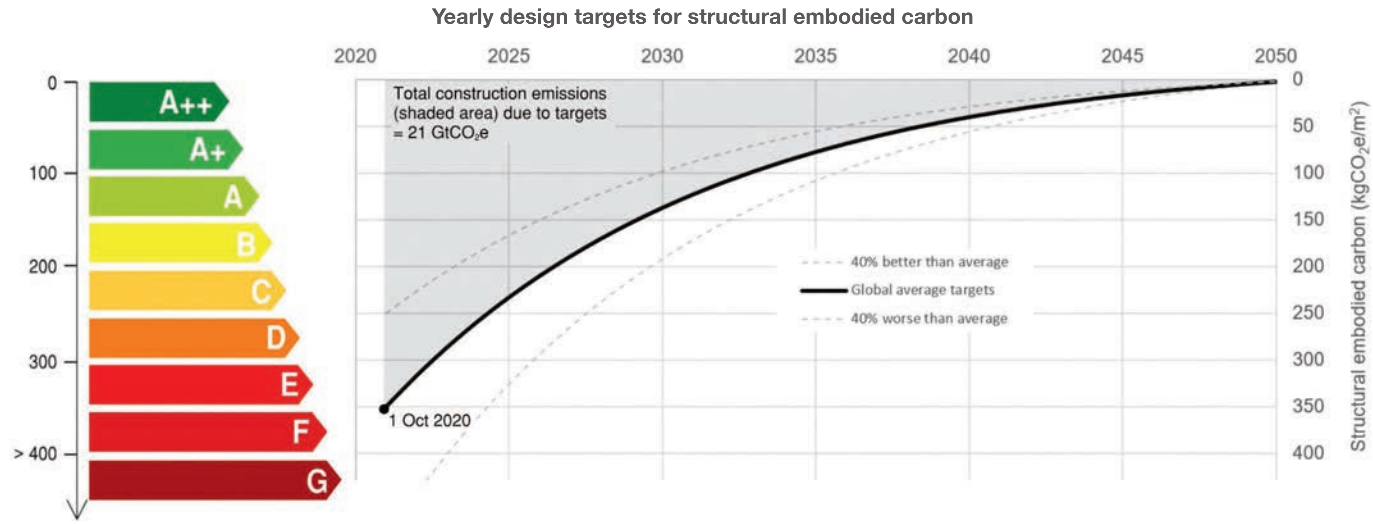
We encourage readers to continue to use SCORS when reviewing the upfront carbon impact of their work, particularly in conversations with clients, who may not know what 'good' looks like. We also remind SCORS users to follow the latest guidance from the Institution when calculating the upfront carbon of their projects. Recent articles highlight the need to consider items such as fire protection and connections, which is also reflected in the updates to HTCEC and TSCT.



↑**FIGURE 2:** SCORS ratings for buildings across past three years of Structural Awards (2022–24)



↑**FIGURE 3:** SCORS/SCORBS ratings for stadia and bridges across past three years of Structural Awards (2022–24)



↑FIGURE 4: Trajectory for spending global carbon budget

We also encourage SCORS to be used alongside other rating schemes. The most common scheme used in the UK in recent years has been the LETI targets (www.leti.uk/), which use similar coloured banding, but with different numbers for different building uses. Similarly, the upfront carbon limits in the NZCBS are set based on building use and how much floor area is new construction. Both LETI and NZCBS are also whole-building, multidisciplinary carbon limits.

Throughout all of this, SCORS remains an indicator of structural efficiency, and remains agnostic of building type. No matter what humanity constructs most of over the coming years, the fact is that we have a dwindling carbon budget to 'spend' on the construction of our structures. The need for the average structure in 2030 to be designed in accordance with a SCORS A rating is true whether we are building long-span office buildings with deep basements, or modest apartment blocks that start at the ground floor.

As we enter 2025, we remind readers of the need to now be targeting a C rating as an average across all projects under their design responsibility, and note that we are only five years away from needing to get this down to an A rating (**Figure 4**). To help answer the question of 'are we getting better?', we also encourage readers to continue to submit project data to the Built Environment Carbon Database (BECD; www.becd.co.uk/), to enable us to track progress across the industry.

In the four years since we first proposed SCORS, the Institution has also generated a plethora of guidance on low-carbon structural design. The Sustainability Resource Map (www.istructe.org/resources/climate-emergency/), *Design for zero*[5], *Circular economy and reuse*[6], 'Net-zero structural design' course (www.istructe.org/events/hq/2025/net-zero-structural-design/) and Muiris Moynihan's article 'How to achieve a SCORS A rating using current materials and technology'[7] show the ways in which we can slash carbon from our designs.

The Structural Awards data tells us that achieving this A rating is possible today, and we hope that when the authors come back together to write our next update on progress for this magazine, our figures might be starting to show a tangible downward trend towards that point.

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