



'We're on the cusp of a major change'

The steel sector is committed to helping the construction industry assess the environmental performance of materials in an accurate and meaningful way. Alan Todd, director of market development at the British Constructional Steelwork Association (BCSA), explains why

Over the past decade, the drive to reduce the environmental impact of construction has resulted in some of the most exciting innovations and dramatic changes that our industry has ever seen. And as all parts of the industry's supply chains work increasingly to targets and requirements set by construction clients and by the government, the means of measuring and assessing environmental performance is developing and improving too.

There is little doubt that lifecycle assessment (LCA) is the most sophisticated, useful environmental measurement approach developed to date. LCA is not a new concept for construction, but it is becoming increasingly refined to make the results as useful and accurate as possible. Standards that are being developed, such as CEN/TC350 in the UK and Europe, show the importance of carrying out an LCA assessment correctly.

By studying the environmental aspects and potential impacts from raw material extraction to manufacture, use and disposal, a whole LCA provides data for each point in a material's life. It is the most complete way to assess environmental impact, and enables true comparisons to be made between the environmental impacts of materials and building approaches.

However there are currently some areas of confusion and uncertainty associated with the whole LCA approach: the term "LCA" is applied at times to cradle-to-gate assessments, which do not include data for a material in use or at the end of life. Assessments that are limited to just some of the elements of a material's lifecycle can only

give part of the picture, and pose a risk that important sustainability decisions may be made with the best intentions but without the longer term environmental impacts - which can be both positive and negative - being taken into account.

Both cradle-to-gate and whole-life cradle-to-grave assessments rely on a number of assumptions in their underlying methodology. However, as the cradle-to-grave approach is, by definition, founded on the correct principle of considering the full lifecycle, it should surely be treated as a more accurate assessment than any approach that excludes key parts of a material's lifecycle.

Whole LCA are beginning to feature more and more in the media as well as in the requirements of clients

"ASSESSMENTS LIMITED TO JUST SOME PARTS OF A MATERIAL'S LIFECYCLE CAN ONLY GIVE PART OF THE PICTURE"

and project teams at the leading edge of our industry - it is the way that the sustainability of our built environment will be measured in the future. But before we reach the point where it is our standard system of evaluation, there are some obstacles that we will need to work on together to overcome.

Primarily, the information about what happens to major construction materials at the end of their useful life must be made more widely available. Without this, the journey to proper whole lifecycle cradle-to-grave assessments becoming the standard across the industry will be very challenging.

The limited information that is needed for a cradle-to-gate assessment is more readily available, so this type of assessment is currently easier to carry out. There is a danger that this approach will be accepted by some practitioners as "good enough". Should this become an attitude that prevails, the construction industry's considerable efforts to reduce its environmental impact will be less effective.

The question for organisations and individuals who truly believe in the sustainability agenda, is what can we do to facilitate the process of change? The BCSA and Tata Steel are committed to making data available that will facilitate cradle-to-grave assessments of steel solutions but practitioners must have access to comparable data for all the major construction materials. This supplement provides cradle-to-grave emission figures for steel and other materials, along with the assumptions that we believe are reasonable for their end-of-life treatment.

We'd welcome views and input from other organisations - please contact John Dowling (BCSA sustainability manager) at cradletograve@steelconstruction.org if you are interested in getting involved and playing your part in construction's journey towards cradle-to-grave whole lifecycle assessment. We're on the cusp of a major change and this is an opportunity to help shape that change. ■

Cradle-to-grave embodied carbon of materials

Below is a table showing the full lifecycle (cradle-to-grave) embodied carbon of some common construction materials. These values were generated for the Target Zero low-carbon building study (see pages 18-19) using recognised information sources. They are presented as an appendix within the Target Zero guidance documents. See www.targetzero.info

| MATERIAL | DATA SOURCE | END OF LIFE ASSUMPTION | SOURCE | TOTAL LIFECYCLE CO ₂ EMISSIONS (tCO ₂ e/t) |
|---------------------------|--|--|---|--|
| Fabricated steel sections | Worldsteel (2002) | 99% closed loop recycling, 1% landfill | MFA of the UK steel construction sector ¹ | 1.009 |
| Steel purlins | Worldsteel (2002) | 99% closed loop recycling, 1% landfill | MFA of the UK steel construction sector ¹ | 1.317 |
| Organic coated steel | Worldsteel (2002) | 94% closed loop recycling, 6% landfill | MFA of the UK steel construction sector ¹ | 1.693 |
| Steel reinforcement | Worldsteel (2002) | 92% recycling, 8% landfill | MFA of the UK steel construction sector ¹ | 0.820 |
| Concrete (C25) | GaBi LCI database 2006 -PE International | 77% open loop recycling, 23% landfill | Department for Communities and Local Government ² | 0.132 |
| Concrete (C30/37) | GaBi LCI database 2006 -PE International | 77% open loop recycling, 23% landfill | Department for Communities and Local Government ² | 0.139 |
| Concrete (C40) | GaBi LCI database 2006 -PE International | 77% open loop recycling, 23% landfill | Department for Communities and Local Government ² | 0.153 |
| Glulam | GaBi LCI database 2006 -PE International | 16% recycling, 4% incineration, 80% landfill | TRADA ³ | 1.1 |
| Plywood ⁵ | GaBi LCI database 2006 -PE International | 16% recycling, 4% incineration, 80% landfill | TRADA ³ | 1.05 |
| Plasterboard | GaBi LCI database 2006 -PE International | 20% recycling, 80% landfill | WRAP ⁴ | 0.145 |
| Aggregate | GaBi LCI database 2006 -PE International | 50% recycling, 50% landfill | Department for Communities and Local Government ^{2(a)} | 0.005 |
| Tarmac | GaBi LCI database 2006 -PE International | 77% recycling, 23% landfill | Department for Communities and Local Government ² | 0.020 |

¹ Material flow analysis of the UK steel construction sector, J. Ley, 2001

² Survey of Arisings and Use of Alternatives to Primary Aggregates in England, 2005 Construction, Demolition and Excavation Waste, www.communities.gov.uk/publications/planningandbuilding/surveyconstruction2005

[a] Adjusted for material left in ground at

end of life.

³ TRADA Technology wood information sheet 2/3 Sheet 59 'Recovering and minimising wood waste', revised June 2008.

⁴ WRAP Net Waste Tool Reference Guide v 1.0, 2008 (good practice rates).

⁵ Data excludes CO₂ uptake or CO₂ emissions from biomass.