



Circular Economy building assessment, accreditation and performance evaluation

Do we need a circular economy performance assessment for the built environment?

The need to adopt a circular economy approach to our built environment has arisen in response to the negative environmental and social impacts of the current ‘take, make and waste’ linear economy. This linear economy approach has been one of the underlining factors that has led to the current climate emergency. A significant aspect of building circular is to reduce the built environment’s impact on climate change by reducing carbon emissions. There is currently a huge drive in the industry to slash operational carbon – a key component of many sustainable certification schemes – but generally comparatively little thought is given to embodied carbon. So, despite industry progress in reducing operational carbon, embodied carbon is expected to increase as a proportion of a building’s total emissions.

A circular economy approach has the potential to reduce embodied carbon through material efficiency, reducing waste and increasing recoverability and reuse. It can also increase business efficiency, cut costs, increase resilience and improve building occupants’ health and wellbeing .

To fully embrace the potential for embedding circularity into a building we should be adopting an approach that highlights, assesses and mitigates as many of the negative aspects of a linear economy that we can. Alongside this we should also identify as many opportunities for embedding circular economy principles as can be found. These need be done throughout the whole life cycle of a building project (Life Cycle Analysis). Everyone involved from the client to the architect, to the product component manufacturers and engineers and contractors are all responsible for making better choices to create a circular building. The assessment approach therefore needs to be taken by all actors involved in the design, build, use, maintenance and deconstruction of a building to ensure that we are achieving the required standards and building performance that will enable us to become a net zero carbon industry.



ABN AMRO Circl Pavilion, Amsterdam – a show case of circularity. The building received a Dutch energy label A+++ and BREEAM “Outstanding” certification.

The building location, design, choice of materials, building methods and communication tools used throughout can have a significant impact on the construction costs, time, the amount of required resources, energy and water, or the amount of construction waste that is produced. It can have an impact on the maintenance costs, the wellbeing and productivity of the occupants, and the building lifespan and end of life value. Additionally, all of these have a carbon impact. We need to understand what both the operational and embodied carbon impacts are for design choices, so the right ones can be made.

When a new building is designed, the planners and funders need to be confident that a building is built to high circular standards and it has a low whole life carbon impact. A new owner or occupier needs to be confident that the building will perform to a high circular standard and retain its' value. At end of life the deconstruction contractor needs to be confident that materials can be recovered and reused in line with high circular standards.

What existing certification and assessment systems are there available?

The number of certifications and regulations addressing embodied carbon in the construction sector is overwhelming. *The Embodied Carbon Review* carried out by Bionova Ltd / One Click LCA in 2018 identified 216 systems worldwide.

In the UK however the number of established systems that address some aspects of embodied carbon and circularity is potentially limited to just a few:

- BREEAM (BRE 1990)
- Whole life carbon assessment for the built environment (RICS 2017)
- PAS 2080 Carbon Management in Infrastructure
- LEED (Green Building Council, US)
- Cradle to Cradle
- Home Quality Mark ONE (HQM ONE) (BRE 2018)
- CEEQUAL (BRE)
- WELL

BREEAM (Building Research Establishment Environmental Assessment Method) was first introduced by the Building Research Establishment (BRE) in 1990. It is the world's longest established method of assessing, rating, and certifying the sustainability of buildings. More than 570,000 buildings have been BREEAM-certified in more than 85 countries worldwide. An assessment is undertaken by independent licensed assessors using sustainability metrics and indices which cover a range of environmental issues. It evaluates energy and water use, health and wellbeing, pollution, transport, materials, waste, ecology and management processes. Buildings are rated and certified on a scale of 'Pass', 'Good', 'Very Good', 'Excellent' and 'Outstanding'.

BREEAM has expanded from its original focus on individual new buildings at the construction stage to encompass the whole life cycle of buildings from planning to in-use and refurbishment. BREEAM keeps evolving and changes regularly in line with national regulations and interests and it is moving towards becoming a fully circular assessment system. The 2018 update pushed forward on two key issues, the performance gap and lifecycle analysis of materials.

Over the years, the number of projects requiring all or parts of BREEAM for planning or funding reasons has increased dramatically. More than half of local authorities in England have now made BREEAM a planning requirement, changing what began as a voluntary standard into a requirement.



Alliander sets the bench mark with a fully circular renovated office in Duiven that achieved a BREEAM 'Outstanding' rating.

Of particular relevance to circularity are the following criteria in BREEAM

Wst 06 Design for disassembly and adaptability

- Reduce waste and cost associated with future refurbishment or fit-out works and ultimately in demolition.
- Improve the ability to cost-effectively reuse and recycle materials.
- Increase the lifetime value of materials and products.
- Encourage consideration of circular economy principles during design and construction.
- Reduce costs and disruption associated with the need for future adaptation, demolition and strip-out, thereby reducing the associated waste and costs.

Mat 06 Material efficiency

- Reduce cost as a result of a reduction of material use in building design.
- Encourage the reuse of existing materials.
- Encourage the use of materials with higher levels of recycled content.
- Improve understanding of, and the performance of, alternative design and construction methods that result in lower material usage and waste levels.

Mat 05 Designing for durability and resilience

- Avoid unnecessary cost and material use resulting from the need to repair and replace damaged elements as a result of operational wear and tear.
- Minimise costs and disruption resulting from environmental degradation to building elements as a result of avoidable weathering and changes to climatic conditions over time.

The **Whole life carbon assessment for the built environment** professional statement was introduced by the Royal Institution of Chartered Surveyors (RICS) in 2017 as they felt that embodied aspect of carbon emissions were not being fully addressed in other assessment systems. To acquire an overall

understanding of a built project’s total carbon impact, it is necessary to assess both the anticipated operational and embodied emissions over the whole life of the asset.

The principles for whole life assessment of the environmental impacts from built projects based on Life Cycle Assessment (LCA) are provided by EN 15978: 2011. This professional statement provides a consistent and transparent whole life carbon assessment implementation plan and reporting structure for built projects in line with EN 15978. It advises that whole life carbon assessments should be undertaken in a sequential fashion during the design, procurement, construction and post-completion stages, starting as early as at concept design stage.

PAS 2080:2016 ‘Carbon Management in Infrastructure’ was commissioned by the Green Construction Board and published by the British Standards Institute in May 2016. The PAS is only concerned with carbon emissions associated with infrastructure (defined as: transport, energy, water, waste and communications sectors), and so does not cover buildings. It however covers the embodied carbon associated with the creation, refurbishment and end of life treatment of an infrastructure asset, for example the construction materials for a motorway.

LEED (Leadership in Energy and Environmental Design). The program is run by the non-profit US Green Building Council and includes a set of rating systems for everything from design to construction and operation to maintenance of homes, buildings, and settlements. It is used in the UK. It is self-assessed and does not use accredited assessors, so fees tend to be lower for one-off assessments than BREEAM.

Cradle to Cradle Certified™ is a globally recognised measure of safer, sustainable products made for the circular economy. The certified product standard is rooted in the Cradle to Cradle® design principles established by William McDonough and Dr. Michael Braungart, in their classic book *Cradle to Cradle: Remaking the Way We Make Things* published in 2002. To receive certification, products are assessed for environmental and social performance across five critical sustainability categories: material health, material reuse, renewable energy and carbon management, water stewardship, and social fairness.



Park 20 | 20, an inspiring, healthy and productive work environment using cradle to cradle materials

Home Quality Mark ONE is a customer- focused, third-party assessment and certification scheme introduced by BRE in 2016. It allows consumers to compare new homes in terms of their likely running costs and understand the overall environmental impact of their home. It covers many things from transport and recreation to flood risk and air quality to maintenance and Post Occupancy Evaluation.

CEEQUAL Version 6 brings together the existing methodologies of CEEQUAL Version 5 and BREEAM Infrastructure Pilot to create a single sustainability rating scheme for infrastructure projects.

The WELL Building Standard® is a performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and wellbeing, through air, water, nourishment, light, fitness, comfort and mind. WELL is managed and administered by the International WELL Building Institute (IWBI). It provides design guidance, such as using natural low VOC materials and finishes, to designers to ensure that buildings are fit for purpose.

In November 2016, the IWBI and BRE announced an alignment between the WELL Building Standard and BREEAM.

Which ones should we use and when?



The Edge, office building located in Zuidas, Amsterdam was given the highest sustainability score ever awarded: 98.4%.in 2016 through BREEAM

There is widespread agreement that using accreditation schemes has significantly improved the sustainability of buildings, yet there remains a concern that such schemes are not flexible enough to support innovation and they are heavy on administration. They are often looked on as box ticking exercises to comply with planning or funding conditions. However, as we now seek to become net zero carbon neutral, the strive to make buildings more sustainable needs to be seen as more than just box ticking.

Whilst each project is different and may suit a different assessment scheme the goal is the same. We need to comply with and ideally exceed regulation and enable clients/consumers to make an informed decision to build or purchase as sustainable a building as possible.

Assessment and certification are important design tools that will provide confidence for consumers and users that certain standards have been considered. A whole life cycle carbon assessment of the materials and the building at design stage enables good decision making. This assessment needs to continue post construction, and so carrying out a Post Occupancy Evaluation confirms that standards have been met and will continue to do so.

Regardless of whether you choose to or are required to use an assessment or certification scheme or not, my advice is to work with your design team to embed circularity design principles at the very beginning of the design process in your brief, to ensure they are incorporated throughout the design, procurement, construction, operation and deconstruction phases of a project.

Zero Waste Scotland can provide FREE specialist support to designers to help identify circular economy opportunities in a project. For more information please contact circularconstruction@zerowastescotland.org.uk

Zero Waste Scotland are sponsoring the first ever RIAS Circular Economy Design Award in 2020, to highlight best of Circular Economy design in Scotland. To enter your project (deadline 20 February 2020) go to <https://www.eventbrite.co.uk/e/riasriba-awards-for-scotland-2020-tickets-83781995203>

Clive Bowman, Circular Construction Project Manager at Zero Waste Scotland.