Building a lower carbon construction industry

Key ideas for reducing the carbon footprint of buildings, from blueprint to build and beyond. By Dominic Burbridge, Associate Director, Carbon Trust Business Advice

Carbon reduction is a complex challenge for all organisations, not least those in the construction industry. Taking a cradle-to-grave view of the construction sector value chain means considering all aspects of the design, construction, use and demolition of buildings and infrastructure, beyond simple occupancy itself. Any energy efficiency improvements in building occupancy mean that the carbon emitted indirectly through the supply chain could form an even larger proportion of that building's lifetime footprint.

This indirect, embodied carbon arises from the extraction of various raw materials, the energy intensive processes associated with the manufacture and delivery of the building materials, and the activities of a multitude of contractors. With the processes to be monitored and managed lying beyond direct control of the industry's main developers and prime contractors, how can construction organisations reduce carbon throughout their extended supply chains? After all, this is a growing priority because, in addition to the environmental benefits, where there's carbon there's cost, and where there's cost there could be savings.

Here are some ideas:

1. Review the selection of raw materials. The extraction, production and transportation of basic construction materials are both energy- and carbon-intensive, so it is critical to select suppliers of building products and materials who are actively working to manage their own carbon impacts.

   Leading cement producer Cemex found that a carbon intensive part of its supply chain was the use of fossil fuel in kilns, which accounted for up to 44% of its carbon footprint. At its Rugby site, Cemex replaced up to 60% of its fossil fuel consumption with waste-derived fuel. Another cement manufacturer, Novacem, a Carbon Trust Incubator company, is developing a new class of cement which will offer performance and cost parity with ordinary Portland cement, but with a carbon negative footprint

2. Investigate the origin of the raw materials. Natural stone, for example, produces minimal emissions during the production process but the transportation from the source to manufacturing site can be the largest cause of emissions, e.g. in transporting from quarries in India. In such cases, managing the transportation process is crucial to managing supply chain emissions. This contrasts with concrete where typically the carbon emissions during production are much higher than those released during transportation.

3. Consider construction phase emissions. Key factors contributing to construction process emissions include the multiple, temporary sites, transportation, waste arising, and heavy machinery which is common in large building projects. Taylor Wimpey is working with Carbon Trust Business Advice to manage and reduce carbon across every one of these factors.

4. Consider how to influence the occupancy and use of buildings and infrastructure. These 'downstream' emissions are generated in the use phase but are greatly influenced by specifications from architects, choices made by developers and clients, and from the way the buildings are used by the people who ultimately work and live in them. The purpose and design of a building also contributes to its embodied carbon. The people using it, the use of lighting, heating, ventilation and air conditioning, and the proportions and differing insulating properties of glass, metal, concrete, brick and wood can all have a tangible impact on the carbon footprint.

   Being mindful of these factors, Whitbread is a great example of a business designing hotels and restaurants in a way that, coupled with good occupier habits and behaviours, can generate a lower carbon impact during end use as well as construction. Whitbread's hotels are now built from locally sourced, sustainable timber and are fitted with ground-source heat pumps using natural energy to provide heating and cooling. Rainwater harvesting and grey water recycling facilities provide 100% of toilet water use and reduce overall water consumption by 20%.

Carbon Trust Business Advice experts are working with several such organisations to help them:

- manage carbon throughout their construction supply chains;
- accurately measure the footprint of individual products in order to identify carbon 'hot spots' (carbon intensive areas) and focus efforts on carbon reduction;
- suggest the use of suppliers that offer low carbon products and those that can demonstrate a consideration for both the direct and indirect impacts of their products and services
- create a carbon strategy and implementation plan;
- understand the likely carbon footprint generated in the use phase, and encourage companies to plan for sustainability throughout the life of the building.

Construction companies that can demonstrate legitimate green credentials are now leading the construction sector in the UK. With lucrative projects ranging from large infrastructure (such as High Speed 2) to non-domestic new build and refurbishment projects being tendered by the public sector, construction companies are under increasing pressure to deliver in line with both their own industry's targets and the government's wider green ambitions, in order to win contracts. Consequently, working to manage and reduce carbon footprints as part of a low carbon strategy, with its inherent cost benefits and revenue opportunities, is increasingly important in the construction sector.