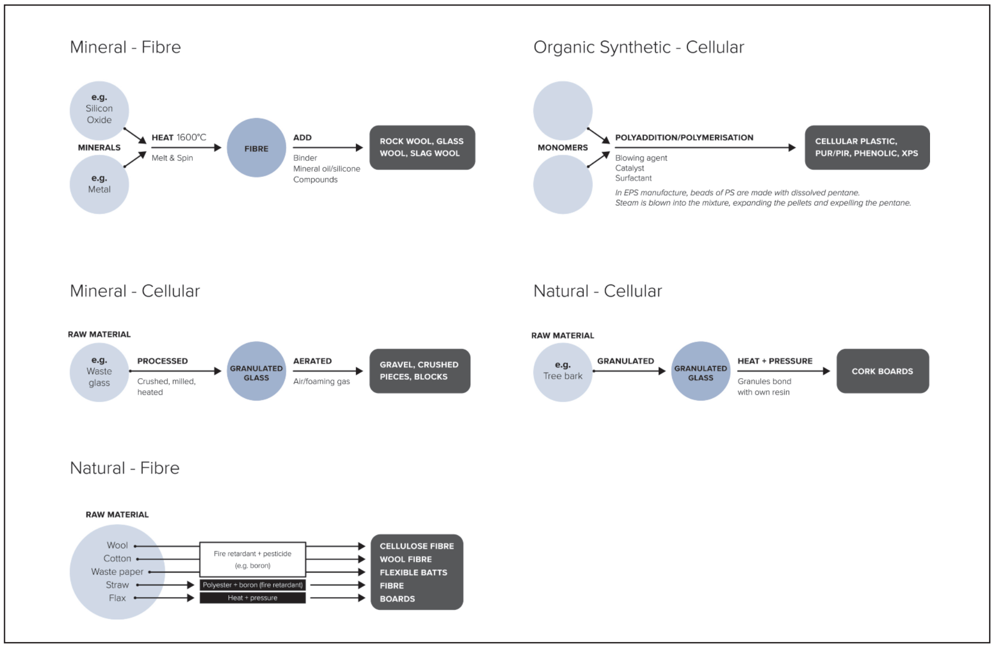
Insulation: getting carbon smart

The Insulation Manufacturers Association discusses embodied energy and insulation…



An essential element in reducing carbon emissions from the built environment will require an understanding and appreciation of the impact construction products, design and the construction process all have on the carbon footprint of buildings.

Consideration of this carbon footprint, also known as embodied carbon, will play an increasingly important role in the journey towards achieving the UK's Net Zero Carbon target by 2050, as according to the World Green Building Council, embodied carbon may account for anything between 30-70% of a building's lifetime carbon.

Identifying and specifying the most suitable products will require a balance between the initial carbon footprint and the in-use carbon over the life of a building for any given material or process.

Buildings must achieve numerous targets over their lifetime, including thermal performance, ventilation, fire safety, comfort, wellbeing and affordability. Therefore greater understanding of products and their make-up is needed to fully appreciate the whole-life costs. A product that has a low embodied carbon may perform less well in the building over its lifetime than a product with a higher carbon footprint but very good performance over many years of use. It is this balance that will become increasingly important when making choices between different construction products.

The recent publication produced for IMA by the independent specialist low-carbon consultancy, XCO2, explains in detail why reducing the embodied carbon in homes is an essential consideration that should not be seen as an afterthought. It highlights the issues associated with energy demand and demonstrates the way enhanced insulation strategies play a crucial role in the built environment to help the UK meet its exacting targets. It also shows how this simple element of construction can provide associated benefits including sustainability, durability, as well as bringing comfort and wellbeing to building occupants.

Consideration must therefore be given to the raw materials and the energy consumed to fabricate materials. In order to attain a truly holistic perspective, other parts of the lifecycle must also be considered such as extraction, processing, transport, distribution, maintenance, reuse, recovery and disposal. The lifecycle stages associated with whole life carbon and embodied carbon are illustrated on the right, in line with the European Standard EN15978.

Because these differing influences on embodied carbon and energy vary widely between different manufacturers and insulations types, it is important that a comprehensive lifecycle assessment (LCA) is completed to gain a more defined understanding of the overall embodied carbon and energy thereby allowing a more rigorous evaluation.

Assessing the embodied impacts of insulants is most relevant to BREEAM and LEED certifications, which require construction materials to be assessed to recognise and encourage the incorporation of materials with a low environmental impact (Mat01; lifecycle impacts and MRc1; building lifecycle impact reduction – applicable BREEAM and LEED credits, respectively). The industry-standard assumptions and relative impact of these between the major insulation types are outlined above left with a particular focus on the raw materials and manufacturing energy requirements.

Mineral insulants

Fibrous mineral insulants are produced by melting the constituent elements at high temperatures (>1,600°C) and spinning the malleable material into fibres. A binding material is