TIMBER DEVELOPMENT UK

Supply

S.70.03-01

Date Published
1 August 2023

Document Type
Timber Knowledge Sheet

Category
Supply

Audience Designer | Supplier | Merchant

Theme
Sustainability

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Sustainable Timber Use

The need to preserve natural resources for future generations has led to increasing interest in the use of timber as a building material. Timber is sustainable due to its inherent properties and characteristics, including its ability to absorb and store carbon for extended periods of time.

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Sustainable Timber Use

Timber is a highly sustainable and renewable construction material. With low thermal conductivity and density, it is an effective insulation material, while its weight-to-strength ratio surpasses steel and concrete – with a lower embodied carbon footprint.

Sustainability is enhanced by sourcing timber from certified suppliers, maximising utilisation of timber, using surplus or recycled materials, and designing for disassembly and re-use.

Timber is widely recognised as a sustainable building material due to numerous benefits and advantages of its properties.

- **Carbon reduction**

Trees naturally sequester carbon as the photosynthesis process absorbs carbon dioxide (CO_2) and converts it into glucose, which the tree builds into the components of wood: cellulose, lignin, and hemicellulose. Around 50% of a tree's weight consists of carbon.

To accurately evaluate the sustainability of materials, carbon sequestration must be considered in the long term, thereby making timber a favourable material choice.

- **Production carbon footprint**

Producing timber has a lower embodied carbon footprint compared to the production of other building materials such as steel and concrete, as it requires significantly less energy to produce. This results in lower fossil fuel usage and a reduction in CO_2 emissions.

- **Biofuel**

Timber can also serve as a near-zero carbon biofuel when sustainably grown and harvested, as it is replanted following its felling. The CO2 released upon combustion of sustainably grown timber is equivalent to the amount reabsorbed by new timber growth through photosynthesis.

Consequently, the only residual CO_2 emissions resulting from the use of sustainably grown timber arise from transportation and processing activities, thereby making it a more environmentally sustainable source of energy compared to other conventional fossil fuels.

- **Low thermal conductivity**

The property of low thermal conductivity implies that heat is not easily transmitted through a material.

When comparing construction materials such as aluminium, steel, cement, brick, clay, concrete, timber, plaster, and glass, timber exhibits low thermal conductivity, and it is approximately 1,200 times lower than aluminium. This makes it a highly effective insulation material for use in walls and structures.

As a result, buildings constructed with timber require less energy for heating and can retain heat efficiently, contributing to greater energy efficiency and cost savings for the homeowner.

- **Low density and thermal mass**

Compared to other construction materials, timber exhibits a low density and low thermal mass. For instance, its density is nine times less than that of concrete and six times less than that of steel.

This low thermal mass leads to a more rapid heating and cooling response of timber buildings.

Increasing Sustainability of Timber Construction

Besides the natural sustainability of its material properties, production practices can further enhance the sustainability of timber. These include:

- **Sourcing timber from certified suppliers**

To reduce the exploitation of forests and combat the effects of deforestation, timber should be sourced from certified suppliers. Such suppliers comply with sustainable forest management practices and assure that the timber being utilised has been sourced from sustainable woods and forests. Notable certification programs are the Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC), and Grown in Britain.

- **Maximising utilisation of timber**

The timber processing sector aims to fully utilise the available resource by manufacturing a variety of sawn, machined, and engineered products, wood-based panels using veneers, particles, and fibres, as well as providing co-products to the horticultural, bioenergy, and equestrian sectors.

The construction sector is increasing utilisation of timber by greater off-site manufacture, and better design through innovation like building information modelling (BIM) and Design for Manufacture and Assembly (DfMA).

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- **Reusing surplus material**

In construction projects, it is common to have excess material. To minimise waste, these surplus materials should ideally be utilised in future construction projects or be sent to recycling facilities where they can be transformed into new products, such as furniture.

This reduces the likelihood of the material ending up in a landfill site.

- **Avoiding contaminants**

The use of contaminants, such as certain glues and preservative treatments, can pose barriers to the recycling process.

By avoiding the use of these substances, the need to remove the contaminants before the timber can be repurposed and reused is eliminated, reducing the risk of contamination in future applications.

Sustainable Timber Use

Increasing the use of bio-based materials such as timber requires changes in construction design, as timber is more prone to degradation in moist environments compared to concrete and metal.

This can be mitigated through proper storage of timber materials during construction and improved design to ensure that in-use moisture content remains below 20%, minimising the risk of fungal and insect degradation.

Where this is not possible then the judicial use of chemical treatments or timber modification can enhance resistance to degradation and improve durability.

Effective fire design also needs careful consideration for timber and timber products. As with structural steel design, structural timber products need a comprehensive set of planned passive fire protection measures. This is most often in the form of gypsum-based panels to provide defined fire resistance for structural frameworks but may also come from timber's predicable charring behaviour in fire scenarios, or chemical enhancements to improve the reaction to fire classification of treated timber products.

Timber offers several advantages, including an impressive weight-to-strength ratio that surpasses that of steel and concrete, yet is much more flexible, making it ideal for tall buildings due to its lower density.

Scaling up Sustainable Timber

The integration of timber as a construction material on a significant scale is imperative in response to the growing demand for housing and infrastructure. Timber has the potential to address the requirements of urban expansion while promoting the reduction of raw material depletion, increasing the number of sustainably managed forests, and balancing the carbon footprint. Given the pressing need for housing to accommodate the growing population, buildings constructed from timber offer a rapid solution that meets the triple sustainability targets of environmental, economic, and social sustainability.

Timber emerges as a highly sustainable and renewable option in comparison to traditional building materials such as steel, aluminium, and concrete. As a versatile and aesthetically pleasing material, timber can be sourced from sustainably managed forests, making it well-suited to meet the demands of the sustainability sector. It provides a tangible, visually appealing, and renewable solution for construction needs.