# Assessing the Environmental Benefits of Preserved Wood

**Why enhance the performance of wood?**

Pressure impregnated timber is a unique and distinct building material. The processes of industrial pre-treatment enhance the performance of wood, adding to its natural properties and allowing timber to be used to its full potential. The enhanced durability afforded to timber by this means have helped built market and consumer confidence in timber as a constructional material and have been a significant factor in the growth of key markets for timber, such as timber frame construction and the use of wood in the garden. Indeed, in the case of timber windows, the added durability and associated product warranties have been an important element in the recent re-growth in the joinery sector.

But why do we need to 'artificially enhance' the performance of wood in this way? Of course, in many situations, we don't. Timber is a wonderful building material, attractive and versatile and, correctly managed, with impeccable environmental credentials. However, many commonly used species can be vulnerable to insect attack and fungal decay when used in higher risk situations – a fact not lost on those producing and promoting materials which compete with wood in the wider marketplace.

The key benefits of preserved wood, many of which are environmental factors, can be summarised as follows –

- Component service life can be extended significantly, particularly in high hazard situations.
- Reduces the need for more costly remedial treatment and building refurbishment at a later date.
- Pretreatment allows the use of lower cost plantation-grown softwoods, thus reducing pressure on more naturally durable, scarcer and higher value species.
- Pretreatment allows the use of perishable and non-durable timber species and the sapwood of all species where they might otherwise be discarded or have a short service life. This makes the most of the timber resource and contributes to waste minimisation.
- Compared with alternative materials of comparable durability, the cost and energy input of pretreated wood production is low.
- By extending its service life, pre-treatment acts to lock carbon into timber for longer, so making a positive contribution to the greenhouse effect 'balance'. (Carbon dioxide is absorbed by growing trees and released again when timber is digested by fungi).

To expand on this last point, the most effective use of forest products from a carbon management perspective is to replace "carbon intensive materials", such as bricks, cement and steel with timber. The substitution of 1 cubic metre of red brick by the same volume of timber can avoid the emission of almost 1100 kg C (4000 kg $CO_2$)[1].

By increasing the proportion of timber used in modern housing and civil engineering projects it is possible to make significant $CO_2$ savings from buildings that are energy efficient, highly functional and aesthetically pleasing.

**Where does the balance lie?**

One of the criticisms levelled against wood preservatives in recent years is that they are "chemical additives" and, as such, must

be undesirable! However, our lives are full of materials which have 'chemical additives'- some we are aware of, others we are not. If we were to assume that the use of chemicals per se was bad and were to eliminate them altogether, our lives would be very different indeed – and not necessarily for the better. We need to assess the balance of benefits and impacts which such additives produce.

Wood preservatives must contain biocides in order to be effective. However, UK government accepts the principle that chemical additives bring real benefits to our lives and society as a whole and, as such, it not desirable to restrict the use of a particular material simply because it may be hazardous. Instead, the regulator has in place regimes based on comprehensive and independent risk assessment.

In general, the industry has succeeded in recent years in introducing biocides which are better targeted towards the organisms we wish to control and are less hazardous to the wider environment. This trend will continue. In addition, wood protection formulations normally chemically bind into the timber after impregnation and are not free to readily migrate in service.

Ultimately, the benefits of treated wood are realised by the designer and builder of a particular project and, of course, the owner and user of the property concerned. In this case, how do we better assess the value of such benefits?

**Assessment Tools and References**

The environmental impact of a range of design and building decisions, including material selection, is of increasing interest to both specifiers and builders alike. Many homeowners are less concerned about such issues, except where they may impact on their fuel bills, but commercial building clients are now also becoming increasingly demanding in this respect. How can we assess the impact of different design choices on the overall impact of a building and what is the potential contribution of selecting pretreated wood, when seen in context as one part of the wider picture? There are 3 key references in this field at present -

1. ***The BRE methodology for environmental profiles of constructional materials, components and building***[2]. These profiles were developed in collaboration with industry and give specifiers a means of comparing the relative environmental impacts of different design options. The project has created both a methodology, which applies a consistent LCA approach (life cycle analysis), and a UK national database providing wider access to environmental profiles generated by industry.

2. ***The Green Guide to Specification***[3]. This handbook provides case studies for different 'functional units' (eg. an external wall) of a building with ecopoints awarded depending on what materials are actually specified for construction (eg. different forms of timber frame construction, brick and block etc.). These points are based on the unit performance against a range of environmental criteria (eg. climate change, ozone depletion, ecotoxicity, recyclability etc.). The points are added to give an overall rating for each unit – either A, B or C ('A' representing least environmental impact). The significant environmental issues for each element are also highlighted.

3. ***BREEAM***[4] (BRE Environmental Assessment Method/Ecohomes). This system is based on the ratings as calculated in the Green Guide and is a design and project management stage assessment tool that provides a transparent environmental 'label' for buildings. It can be used in a variety of ways, both to specify an overall building design 'target' or inform the choice of materials along the construction process.

For more detail on any of the above, please see the references section at the end of this paper. With regard to the use of wood and, in particular pre-treated wood, in construction these 3 documents come to several common conclusions –

- The most significant impact factors overall are energy consumption in manufacture and in transporting materials to site (ie. embodied energy) and energy efficiency in use.
- Timber forms of construction tend to score well in most applications.
- Timber treatment is so insignificant a factor overall as to not alter a functional unit's impact rating, regardless of whether it is treated or not.
- The use of treated softwood in structural or non-structural elements does not undermine the strong environmental case for the use of wood components in buildings.

Indeed, in many situations, treatment improves the overall rating of timber by extending the life of a component and so minimising the environmental impact of early disposal and replacement.

**Addressing the issues**

So, in terms of domestic and industrial building design and impact, and indeed cost, we can see that the adverse impact of using preserved wood is insignificant whilst the benefits are real and tangible. This is good news for the specifier, builder and homeowner alike.

However, there is no room for complacency. The industry readily accepts the need to push on with the development of systems which are ever more benign whilst still effective. In addition, industry is very conscious of the need to look at the whole life cycle of their products and to consider the 'grave' as well as the 'cradle', particularly in terms of the disposal procedures for redundant treated wood. In this respect, the burning of waste treated wood as fuel or disposal by composting show particular promise.

**Conclusions**

Members of the Wood Protection Association play a vital role in continuing to build and sustain confidence in timber as an effective and durable constructional material. Whilst the need to push onwards with research and development is crucial, to meet the evolving environmental agenda of the market, we must also continue to ensure that the products and systems on offer continue to be effective and fit for purpose, whilst maintaining the clear environmental benefits of treated wood to the specifier and end-user.

**References :**


1. 'The UK's Forest : A Neglected Resource for the Low carbon Economy?' ECCM

2. 'The BRE methodology for environmental profiles of constructional materials, components and buildings'. BR 370, available from the BRE Centre for Sustainable Construction.

3. 'The Green Guide to Specification'. Third Edition. Pub. Blackwell Science Ltd.

4. 'BREEAM Handbook'. Available from BRE Bookshop.



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