Timber Trade Federation
growing the use of wood

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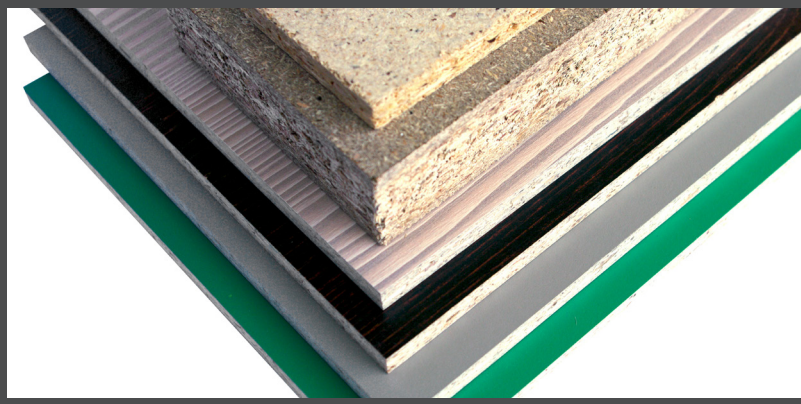
The leading authority on wood

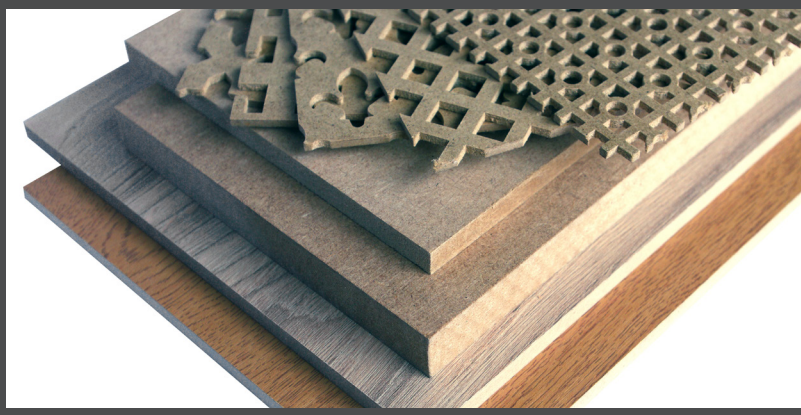
Wood Panel Industries Federation

Panel Guide

Version 4







5 Environmental aspects

5.1 Sustainability

Wood-based panels have good sustainability credentials. They make efficient use of the forestry resource from the peeling of logs into veneers for plywood, to the utilisation of small diameter roundwood and recycling of post-industrial/consumer wood waste. Wood-based panels have the capacity to store the carbon which is captured from the atmosphere by growing trees as they photosynthesise. Installing wood-based panels into structures such as housing with a design service life can help to provide a longer-term carbon store.

The key sustainability issues related to panel manufacture are:

- Responsible sourcing:
  - ensuring virgin wood raw material inputs are from legal and sustainable sources
  - demonstrating that the nature and environmental suitability of reclaimed post-consumer wood is of an appropriate quality.
- Making sure that environmental, social and health and safety issues/impacts are minimised during the manufacturing process of wood-based panels. This includes issues relating to energy use, dust, noise, and management of effluents and waste products.
- Recyclability of the panels at the end of their life.

Each of these phases impacts environmentally on the community and on the individual consumer, so that the control of wood in manufacture is essential for the purposes of:

- Optimising the standards of environmentally sustainable management; and
- Eliminating environmentally or ecologically undesirable consequences resulting from processed wood materials and products.

5.2 Environmental advantages of wood

Timber has obvious advantages over many other materials: it has the potential to regenerate and therefore offer a continuous supply for our use; wood is also recyclable, waste efficient, bio-degradable and non-toxic. Timber has also proven to be particularly energy efficient in use, and as such can play a major role in combating global warming.

Forest area in temperate and boreal regions continues to increase despite a growth in the volume of timber extracted to meet a rising demand for wood products. Young trees are far more effective absorbers of carbon dioxide (CO_2), the principal greenhouse gas, than mature trees. Thus harvesting mature trees and planting or naturally regenerating replacement forest growth can increase the amount of carbon sequestered from the atmosphere, thereby helping to mitigate the greenhouse effect.

Timber processing achieves high levels of material utilisation due to:

- modern sawing technology
- applications for the so-called sawmilling products (shavings, chips, sawdust etc) in panel production and other products
- the many opportunities to use wood waste for fuel.

Timber has a naturally low thermal conductivity and is an excellent insulator; in this respect it can be approximately 15 times more efficient than concrete, nearly 400 times more efficient than steel and in the order of 1700 times more efficient than aluminium. A 2.5cm timber board has better thermal resistance than an 11.4cm brick wall.

In buildings, as the required operational energy reduces through improved airtightness and insulation, the overall lifetime embodied energy of the building will be reduced. It follows that when less energy is required for the day-to-day running of a building, the embodied energy held within the materials from which it is constructed will have a greater bearing on the total energy invested in a building during its entire lifecycle.

Timber has an advantage in that compared with many competing materials it combines the qualities of lightness with strength. These merits contribute to timber buildings having both low embodied energy and low thermal conductivity, thus reducing energy requirements for construction and enhancing energy efficiency during use. In addition, the benefits offered by timber are further enhanced by the capacity of trees to remove atmospheric CO_2 during plant growth and store the carbon in timber products during their service life, thus further enhancing carbon savings. Timber is therefore an attractive construction material to use in terms of meeting goals for reducing CO_2 emissions to the atmosphere.

The advantages of building with wood in terms of CO_2 saved has been illustrated in a case study 'Open Academy Norwich' published by BSRIA and Bath University[1]. The building in question is made from cross-laminated timber and the consultant in charge of the project demonstrated that, compared with a concrete structure, the timber structure is far superior in terms of embodied tonnes CO_2. When sequestration is included, the timber structure has a negative carbon value of –2100 tCO_2 whereas the same structure made from concrete would have an impact of +1720 tCO_2. This equates to an approximate saving of 3800 tCO_2 compared to the concrete structure.

'The combined effect of carbon storage and substitution means 1m^3 of wood stores 0.9t CO_2 and substitutes 1.1t CO_2 – a total of 2t CO_2', (Dr A Fruhwald, Hamburg University).

5.3 Raw materials used in the manufacture of wood-based panels

Two potential raw material streams are available:

- Virgin (non-recycled) fibre in the form of veneers, small diameter roundwood or sawmill co-products utilising those elements of the cylindrical log that are not suitable for rectangular sawn or profiled sections.
- Reclaimed post-consumer wood as a recycled and reprocessed raw material of appropriate quality.

5.3.1 Virgin (non-recycled) fibre

The virgin wood fibre used to manufacture wood-based panels is traditionally classified as either hardwood or softwood. Paradoxically this classification does not necessarily indicate the hardness, or softness, of the wood itself. Most (but not all) softwoods are from needle-bearing evergreen trees, and most hardwoods are from broad-leaved trees.

Woody (ligno-cellulosic) materials derived from other plant groups as well as hardwoods and softwoods are used by some producers in the manufacture of particleboards. These include materials such as flax shives (the resultant panels being known as flaxboard), bamboo, rattan, sugar cane residues (bagasse) etc. These materials are not typically used in particleboard and fibreboard manufacture in the United Kingdom but may be found in some imported products.

The relative proportion of softwoods and hardwoods from forest sources that is used in the manufacture of the wood-based panels covered by PanelGuide depends largely on the relative amounts available within economic range of the processing site. In Europe, softwood species are predominately used in the manufacture of particleboards and fibreboards whereas hardwood species are predominately used in European plywood production. Virtually no hardwood is used in the manufacture of particleboards or fibreboards made in the United Kingdom and Ireland, although a small proportion may be included in the recycled timber content of particleboard. Imported boards may come from regions where quite different proportions are used.

The principal concern of the wood-based panel user is not the species from which the panel is made but its inherent properties, appearance and consequent performance.

In addition to the softwood and hardwood logs referred to above, other sources of timber are used in wood-based panel manufacture. These include chipped forest residues (branches and tops), wood products from the sawmilling process (sawmill products) (chips, sawdust, slabs and off-cuts). In addition to these, reclaimed wood from either post-consumer or post-industrial sources is used particularly in the manufacture of particleboard (wood chipboard).

5.3.2 Recycled fibre

The Wood Recyclers' Association estimates that the UK generates approximately 4.5 million tonnes of wood waste per year of which over 60% (29 million tonnes in 2013) is being recycled or recovered. This represents enormous progress since the Government introduced landfill tax in 1996, when it is believed that the recycling rate was less than 4%. Wood waste that has been diverted from landfill is now exploited in such products as animal bedding, horticultural products (such as mulch, soil conditioners and compost), biomass (for heat and electricity generation) and wood-based panels – in particular, particleboard and medium density fibreboard (MDF).

In 2013, the wood recycling sector produced over 850,000 tonnes of wood fibre for wood-based panel product manufacturers based in the UK, plus a further 165,000 tonnes for the wood-based panel product export market.

The following definitions[2] are recognised by the UK wood-based panel industry:

- Recycled wood: wood, in the form of either:
  - reclaimed pre-consumer by-products from manufacturing processes (for example from the manufacture of wood-based panels, assembled products, building structures) or
  - reclaimed post-consumer wood material (such as pallets or other wood packaging material, demolition waste, used furniture) which after reclamation is recycled as a raw material into the chain of commercial supply and reduced to a raw material form.
- Industrial by-products (pre-consumer recycled wood): wood material in the form of sawdust, fibrous wood, solid wood off-cuts or composite wood off-cuts resulting from any wood transformation or manufacturing process and which may be reclaimed and recycled as raw material for a manufacturing process.
- Sawmill products: a class of virgin wood consisting of chips, slabs, sawdust and the like, co-produced with the cutting of sawn wood from the roundwood log and used as materials for industrial processing or other commercial applications.

5.3.3 Standards governing the quality and safety of recycled wood

The use of recycled wood in the manufacture of particleboard or MDF requires deliveries of the material to the processor to be free from incompatible waste elements such as stone, metal and plastics. It is also desirable that producers and traders should observe state-of-the-art practices to ensure that reclaimed raw materials and the

finished panel product are strictly controlled in respect of contaminating chemical elements and compounds that might be present at unacceptable levels in recycled wood.

Freedom from visible and separable physical contaminants is assured by the purchasing and delivery conditions imposed by the panel manufacturer and by the decontaminating and cleansing processes operated by both merchant and manufacturer.

With respect to chemical contamination, a number of national quality control schemes exist, the most prominent in Europe being the German criteria defined for purposes of the RAL-Gütezeichen label 'Recyclingprodukte aus Gebrauchtholz'. In the UK the wood-based panels sector supports the European Panel Federation (EPF) 'Industry Standard for delivery conditions of recycled wood', which is based on a 'responsible care' approach. *Table 5.1* lists the maximum level of various elements and compounds permitted under the EPF Industry Standard.

Table 5.1: The full list of contaminant limit values in g/kg of recycled wood and further extracts from the EPF Industry Standard

Elements/compounds	Limit values (g/kg)
Arsenic (As)	0,025
Cadmium (Cd)	0,050
Chromium (Cr)	0,025
Copper (Cu)	0,04
Lead (Pb)	0,09
Mercury (Hg)	0,025
Fluorine (F)	0,1
Chlorine (Cl)	1
Pentachlorophenol (PCP)	0,005
Creosote (Benzo(a)pyrene)	0,0005

The EPF Industry Standard provides a list of reference test methods for the chemical analysis of recycled wood, and the range of appropriate test methods is in a continuing programme of development and improvement.

Published in the UK under the auspices of WRAP is the BSI's Publicly Available Specification, *PAS 104 Wood recycling in the panelboard manufacturing industry*[3], a specification for quality and guidance for good practice for the supply of post-consumer wood for consumption in the manufacture of panelboard products. Related to this is *PAS 111 Specification for the requirements and test methods for processing waste wood*[4], which provides definitions, minimum requirements and test methods for processing waste wood into materials intended for use in suitable applications or end products including that for use in particleboard manufacture.

5.4 Responsible sourcing

Generally speaking, the temperate and boreal forest areas of the world are increasing in size; as more forests come under active management, they become much more productive in all senses. It is widely regarded that a large proportion of forests in such regions are managed sustainably, with many of them verifying this status through third party auditing of their forest management activities according to industry approved standards such as FSC and PEFC. Northern Europe, including countries such as the UK, Ireland, Scandinavia and Germany, is one example of such a forest area, which provides the significant majority of wood-based panels consumed in the UK.

It is generally accepted that rates of deforestation since 2000 have decreased globally, although it is still an issue that is a cause for concern, not only from a climate change perspective, but also from an increasing loss of biodiversity. In global terms, it is now generally accepted that the main cause of deforestation is not the timber industry but agriculture. With the population of the world expanding fast, large swathes of forest are lost when converted to agricultural production for crops, such as palm oil and soya beans, and livestock.

The timber industry plays its part in deforestation where there is illegal logging; however the main impact of the timber industry is in forest degradation rather than deforestation. This occurs through building logging roads in particular, some of which are then used by the agriculturists as a way into the forests.

The primary areas for concern when it comes to illegal logging or unsustainable practices are mainly in the tropical regions of the world where governance is often weaker and enforcement of forest laws and codes more challenging. Many tropical countries are also categorised as developing countries and therefore also have the challenge of managing their natural resources in a way that supports economic development rather than hindering it.

These key drivers of illegal logging in such countries have been recognised and an international response has been developed, led by the European Union (EU) in 2003, under the auspices of the Forest Law, Enforcement, Governance and Trade (FLEGT) action plan.

5.4.1 International policy response to illegal logging

The FLEGT action plan, developed by the EU in 2003, aims to tackle the problem of illegal logging by supporting responsible trade in forest products. The action plan has a two-pronged approach, shown in *Figure 5.1*.

This guide focuses on the demand-side policy driver that has been developed by the EU to tackle illegal logging, namely the EU Timber Regulation.

5.4.2 EU Timber Regulation

The EU Timber Regulation (EUTR) came into force on 3 March 2013. There are two parts of the EUTR, and

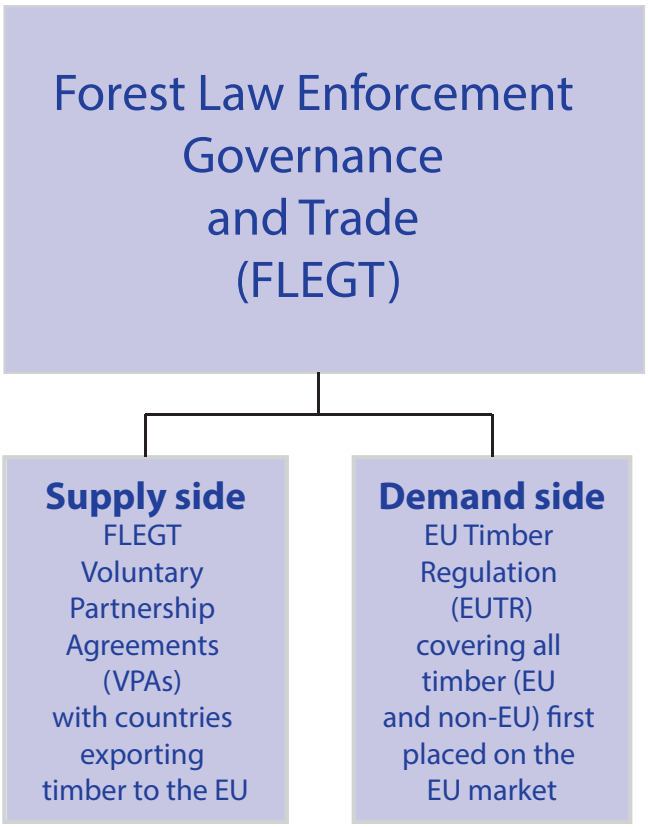


Figure 5.1: The FLEGT action plan

anyone found to be breaking the law could face criminal charges.

1 A prohibition on the 'first placing' of illegally harvested timber and timber products onto the EU market.
2 Operators (First Placers) placing timber and timber products onto the EU market for the first time must exercise due diligence to mitigate the risk that this timber has been illegally harvested. Essentially, they must implement a due diligence system which:
   a. Provides information about the supply of timber products, including description, species, country of harvest, quantity, name and address of supplier and trader and documents indicating compliance with the applicable legislation
   b. Evaluates the risk of placing illegally harvested timber and timber products on the market. Criteria which can be used to assess this risk include:
      i. assurance of compliance with applicable legislation, including certification schemes, third party verification
      ii. prevalence of illegal harvesting of specific tree species
      iii. prevalence of illegal logging in the country of harvest
      iv. UN or EU sanctions on timber imports or exports
      v. complexity of the supply chain
   c. Unless the risk of illegality is negligible, takes steps to mitigate this risk, for example: additional information, third party verification.

In terms of wood-based panels as a whole, a significant proportion of UK consumption is manufactured in the UK or Ireland, with a further proportion coming from other EU Member States. Meeting the requirements of the EUTR in such cases is relatively simple. It is the individual or company harvesting the trees that go into panel production that has the responsibility of undertaking this due diligence. In most cases it will be the forest owner(s) or a company that is managing the forest on behalf of the forest owner(s) that has the responsibility to undertake due diligence. Plywood is the main exception to this sourcing model where global sources contribute significantly to UK consumption.

Where things become more complicated is when panels such as plywood are imported from outside of the EU, from areas such as the Far East, South America or Africa. In such instances it is the job of the panel importer to undertake due diligence to ensure that the products they are purchasing are from legal sources. The job for the panel importer is much more complex as they need to fully understand the supply chain of their product(s), ensuring that the origin of the raw material inputs was legal as well as ensuring strong controls are in place throughout the various processing/manufacturing points in a supply chain to ensure legal raw material is not substituted with illegal material.

Manufacturers and suppliers can provide more information on the responsible sourcing of their products and how they are meeting the requirements of the EUTR.

5.4.3 Certified timber

Certified timber originates from a forest that has been verified to meet suitable sustainability criteria for forest management. Agreed key sustainability principles and criteria are applied through approved forest management criteria which are adapted to meet the needs of the country/region of the world where the certification is applied.

The following identifies the principles that are typically required for sustainable forest management:

- compliance with laws and all sustainability principles
- clear and defined long-term tenure and use rights
- identification of and respect for indigenous peoples' rights
- maintained/enhanced community relations and workers' rights
- maintained/enhanced long-term economic, social and environmental benefits from the forest
- maintained or restored ecosystem, its biodiversity, resources and landscapes, including maintaining high conservation value forests
- management plans with implemented, monitored and documented progress towards objectives in both natural forests and plantations.

Once timber is harvested from a certified forest, companies in the supply chain must have in place an audited Chain of Custody (CoC) management system.

This third party audited CoC system provides buyers with an assurance that individual companies have systems in place to ensure certified and uncertified timber is not mixed, and hence to be sure that the timber they are buying has originated from a certified forest.

There are two main certification schemes that exist internationally and are used commonly in the UK. They are:

- Forest Stewardship Council (FSC), established in 1994: www.FSC.org
- Programme for the Endorsement of Forest Certification (PEFC), established in 1999: www.pefc.org

Each individual company has its own Forest Management or CoC certificate number (eg TT-CoC-1234), which can be verified against each individual scheme's database of certificates.

In the UK, forests will normally be certified as managed in accordance with the UK Woodland Assurance Standard (UKWAS), which was established under the auspices of the Forestry Commission in June 1999 and is recognised by the FSC as consistent with the FSC's own standards of sustainable forest management. Certification to the UKWAS standard by FSC-accredited certifiers therefore entitles a forest management company to label timber sourced in the certified forest with a label incorporating the FSC logo at the point of transfer. The PEFC Council also recognises and approves the UKWAS standard with similar results for any forest requiring a PEFC label and certified by nationally accredited certifiers.

For buyers, purchasing certified timber with full CoC is the best guarantee that timber comes from a legal and sustainable source. For this reason such purchasing forms an important element of responsible sourcing and compliance with the EUTR.

5.5 Environmental performance of products

5.5.1 Introduction

The environmental performance of products and the manufacturers supplying these items is becoming increasingly significant to specifiers and end users when making choices about the combinations of products and designs for buildings. The sequence of stages from raw material extraction through to recycling or disposal is known as the life cycle of the product.

Calculation of the environmental impact of a product at all stages of the life cycle is called Life Cycle Assessment (LCA).There are now well-developed tools and methodologies for collecting LCA data on specific products and calculating the impacts. This data can be verified to produce Environmental Product Declarations (EPDs), a recognised way of demonstrating the impacts of a particular product. A number of wood-based panel manufacturers have invested in this process and buyers will increasingly be able to access EPDs for specific branded products through the sales and marking sections of these companies.

This section gives an overview of a new platform developed by Wood for Good, the Lifecycle Database, and some of the ways in which the UK wood-based panel manufacturers are currently providing this type of information, namely, carbon footprinting and information based on Life Cycle Assessment (BRE Green Guide to Specification).

5.5.2 Carbon footprint calculation

According to the Carbon Trust, the definition of a carbon footprint is 'the total set of greenhouse gas emissions caused directly and indirectly by an [individual, event, organization, product] expressed as CO2e'.

The carbon footprint can be used by manufacturers for benchmarking themselves against other organisations in terms of their greenhouse gas emissions, but only when the same calculation methodology has been used. It is also a useful tool for managing emissions and monitoring their reduction over time as part of an environmental management system. However it is not just manufacturers who have a carbon footprint, it is virtually all of us in our day-to-day lives through the products we consume or use.

In order to calculate an accurate carbon footprint, all possible sources of carbon need to be taken into account. There are three main sources that can be controlled to different degrees:

- direct emissions from an activity that is controlled by the organisation/person
- emissions from electricity
- indirect emissions from products and services.

In order to produce a carbon footprint, the Carbon Trust recommends five different steps to achieve a transparent carbon footprint, these are:

- define the methodology so that a consistent approach can be achieved
- specify the boundary and scope of coverage
- collect the data and calculate the carbon footprint
- verify the results (optional)
- disclose the results (optional).

To help complete the above steps there are a number of useful information sources, these are:

- Green House Gas (GHG) protocol
- BS EN ISO 14064 Parts 1 and 2Greenhouse gases[5]
- DEFRA
- Carbon Trust

5.5.3 Wood for Good Lifecycle Database

5.5.3.1 Introduction

The aim of the Lifecycle Database (formerly known as Wood First Plus) project is to create a free online information hub containing all of the environmental and design data necessary to specify timber as a first choice material. In particular, it focuses on providing generic LCA datasets for key timber products used in the UK.

5.5.3.2 The Lifecycle Database

PE International was engaged by Wood for Good and its industry partners to oversee the collection, analysis and review of existing life cycle assessment (LCA) data for a wide range of timber and timber products. The company has extensive experience in the construction materials sector and in working with the timber industry, having previously completed a major LCA project on US hardwood lumber for the American Hardwood Export Council (AHEC). This data has been used to generate generic LCA datasets for key timber products used in the UK.

The project is a result of ongoing consultation with timber industry organisations and external stakeholders, including contractors' groups, architects, professional institutions and many others. All stakeholders are able to access whole-life information on timber products free of charge through a dedicated website, managed by Wood for Good. Individual timber companies will be able to use these data as a basis for developing specific EPDs for their products and PE International is currently engaged in developing tools to facilitate this process. There are generic data sets freely available for a number of panel products: high density fibreboard (HDF), medium density fibreboard (MDF), melamine coated particleboard, oriented strand board (OSB), particleboard (uncoated) and plywood.

To find out more and to download the generic datasets for free, visit:

http://woodforgood.com/sustainability/lifecycle-database

5.5.4 BRE Green Guide to Specification

5.5.4.1 Introduction

BRE Global and the UK and Ireland wood-based panels sector have worked together to produce generic environmental profiles for particleboard, MDF and OSB produced in the UK and Ireland. These environmental profiles, produced according to BRE Global's updated Environmental Profiles Methodology, have been incorporated into BRE Global's materials environmental profiles database. The data has been used within BRE Global's updated Green Guide to Specification.

5.5.4.2 The Green Guide to Specification

The Green Guide online (www.thegreenguide.org.uk – also available in book form) has been produced by BRE Global to assess building materials and components in terms of their environmental impact within a building construction across their entire life cycle, which is termed as 'cradle to grave'.

The Green Guide is a tool used within BREEAM (BRE Environmental Assessment Method), an accredited environmental rating scheme for buildings, and the Code for Sustainable Homes. The Green Guide contains more than 1200 specifications used in various types of building. Since the previous edition, information on the relative environmental performance of some materials and components has altered, reflecting changes in manufacturing practices, the way materials are used in buildings and our evolving environmental knowledge.

There are currently six different generic types of building reviewed in the Guide:

- commercial buildings, such as offices
- educational
- healthcare
- retail
- residential
- industrial.

The environmental rankings are based on Life Cycle Assessments (LCA), using BRE's updated Environmental Profiles Methodology.

Materials and components are arranged on an elemental basis so that designers and specifiers can compare and select from comparable systems or materials as they compile their specification. The elements covered are:

- external walls
- internal walls and partitions
- roofs
- ground floors
- upper floors
- windows
- insulation
- landscaping
- floor finishes.

This data is set out using an A+ to E ranking system, where A+ represents the best environmental performance/least environmental impact, and E the worst environmental performance/most environmental impact. BRE has provided a summary environmental rating 'The Green Guide rating', which is a measure of overall environmental impacts covering the following issues:

- climate change
- water extraction
- mineral resource extraction
- stratospheric ozone depletion
- human toxicity
- ecotoxicity to freshwater
- nuclear waste (higher level)
- ecotoxicity to land
- waste disposal

- fossil fuel depletion
- eutrophication
- photochemical ozone creation
- acidification.

For more information go to www.thegreenguide.org.uk

5.6 References

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Contact details for the PanelGuide project partners are:

Wood Panel Industries Federation
Autumn Business Park
Dysart Road
Grantham
Lincs
NG31 7EU
Tel: 01476 512 381
Email: enquiries@wpif.org.uk
Website: www.wpif.org.uk

Timber Research and Development Association
Chiltern House
Stocking Lane
Hughenden Valley
High Wycombe
Bucks
HP14 4ND
Tel: 01494 569 603
Email: information@trada.co.uk
Website: www.trada.co.uk

National Panel Products Division
Timber Trades Federation
The Building Centre
26 Store Street
London
WC1E 7BT
Tel: 020 3205 0067
Email: ttf@ttf.co.uk
Website: www.ttf.co.uk

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