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Environmental impact of biomaterials and biomass

Nigel Jones and Jo Mundy

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Tel: +44 (0) 1344 328038
Fax: +44 (0) 1344 328005
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Printed using FSC or PEFC material from sustainable forests.

FB 67

First published 2014

ISBN 978-1-84806-371-6

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Glossary

Allocation: sharing the input or output flows of a unit process to the product system under study. This may need to be done where a manufacturing process results in products and co-products, eg steel and slag.

Ecopoints: (as used in the BRE Environmental Profiles methodology) the normalised profile values are multiplied by weighting factors developed for each impact category and the results summed to give a single figure.

Environmental impact category: environmental issue being examined, eg climate change, acidification, human toxicity.

Environmental Profile: the level of impact in each environmental impact category for the functional unit or product being studied.

Functional unit: a qualitative description of function specifically defined for the product/service under study and any alternative products/services to which it is compared. The use of a functional unit means that the alternative designs under study are, in theory, compared fairly. For example, a comparison of external walls may be based on every external wall design in the study achieving a U-value of 0.3 W/m^2K and compliance with building regulations.

Input: material or energy that enters a unit process (can include raw materials and intermediate products).

Intermediate product: material that has already been processed before being used to produce a product.

Life cycle: consecutive and interlinked stages of a product system from raw material acquisition or generation of natural resources to the final disposal.

Life cycle assessment (LCA): compilation and evaluation of the inputs, outputs and potential environmental impacts of a product system throughout its life cycle.

Life cycle inventory (LCI): the product system input and output flow data used in carrying out the LCA.

Normalised profile: the characterised profile is referenced to the environmental impact for each category at the national or global level in one year (usually for one citizen), giving a 'normalised' profile; the values are directly comparable.

Output: material or energy that leaves a unit process (may include raw materials, intermediate products, products, emissions and waste).

Raw material: unprocessed material that is used to produce a product.

Sequestration: (of carbon) the removal and long-term storage of carbon dioxide (CO_2) from the atmosphere in biomaterials such as timber and agricultural products.

1 Introduction

This report provides a review of how biomaterials and biomass have been assessed in *The Green Guide to Specification* (fourth edition)[1], including the application of the BRE Environmental Profiles methodology[2], which underlies *The Green Guide*. Biomaterials are defined here as construction materials derived from plant or animal sources. Biomass refers to a biomaterial used for energy generation.

Whilst this report focuses predominantly on timber, wood-based panels and biomass energy, it has been produced as part of a series covering the background to the major material groups incorporated into *The Green Guide*. Many of the other reports in this series, eg *Environmental impact of windows*[3], may also be of interest when considering the environmental impact of biomass and biomaterials in construction.

2 Sector overview

Within *The Green Guide*, biomaterials are classed as naturally derived construction materials (ie those originating from plant or animal sources) providing both structural and non-structural functions within the building fabric. Biomass, however, is biological material used as a fuel. This is often used to mean plant-based material, but biomass can equally apply to both animal- and vegetable-derived materials.

For example, sawn softwood timber used in the construction of timber frames or as studwork is categorised as a biomaterial due to the structural function it is fulfilling. However, wood such as poplar or willow grown specifically to generate electricity or produce heat through direct incineration is classed as biomass.

Biomaterials most commonly used in UK construction and therefore those currently covered in *The Green Guide* are solid timber, timber products such as wood-based panels, cellulose, plant fibres and animal fibres. These biomaterials are described in more detail in the following sections.

The Waste and Resources Action Programme (WRAP) estimates that around 10 million tonnes of wood and wood products are consumed in the UK annually. The majority of this is imported. The construction industry is by far the largest consumer, using around 50%[4], with private new housing activity having the highest wood consumption. The contraction in UK construction output over recent years has resulted in a reduction in consumption of wood and wood products by the construction sector.

Sawn softwood, particleboard and fibreboard are mainly imported from EU countries whereas UK imports of plywood come mostly from countries outside the EU, such as China, Brazil and Malaysia[5].

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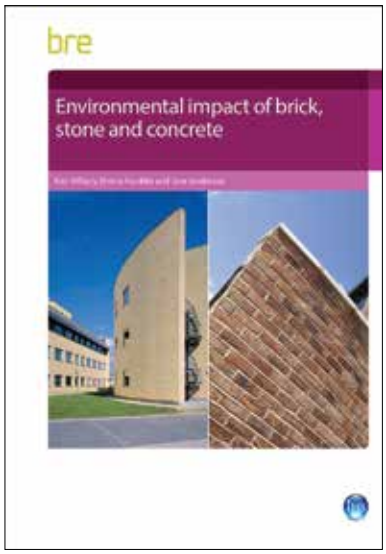

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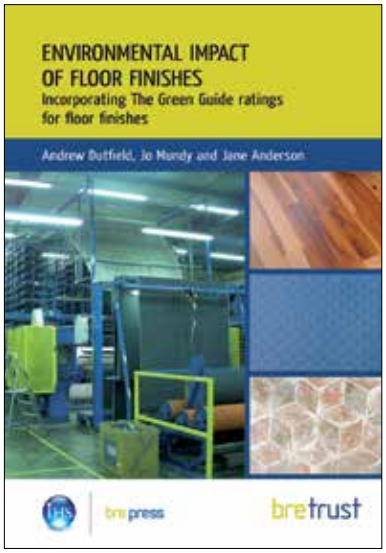

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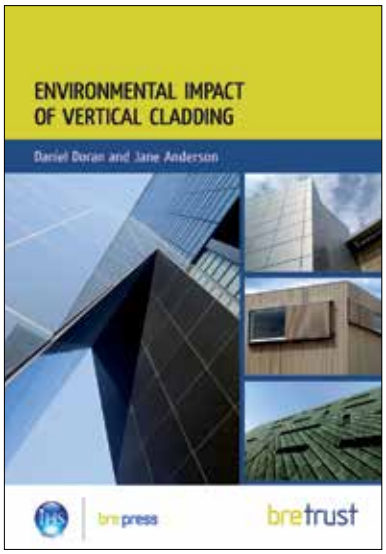

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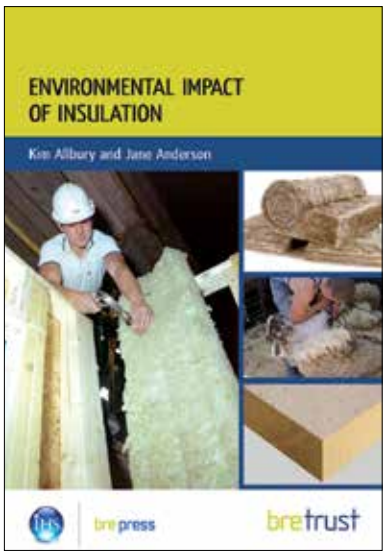

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Environmental impact of biomaterials and biomass

This report reviews how biomaterials and biomass have been assessed within *The Green Guide to Specification*, including the application of the Environmental Profiles methodology, which underlies Green Guide data. The way in which biomaterials and biomass are addressed within building-level environmental assessment schemes such as BREEAM and the Code for Sustainable Homes is also explained.

The report will give manufacturers and specifiers a general understanding of the significant benefits and impacts of biomaterials and biomass over their whole life cycle and help to identify opportunities for improvements to their environmental performance. It is part of a series that provides comparable information on windows, masonry and concrete, metals, floor finishes, cladding and insulation to assess the environmental impact of specific construction materials.

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