



# Polymer Composites as Construction Materials

## Application Summary Sheet 11

**Title:** Eco-Composites

**Target Audience:** Civil and Structural Engineers, Architects, Building Specifiers

**Keywords:** Eco-composite, natural fibre, bio-derived, reclaimed waste.

### Overview of application/summary:

*Eco-composites* is a term which is used to describe composite materials with environmental and ecological advantages over normal composite materials such as FRPs. The drive towards sustainable construction and environmental legislation such as the End of Life Vehicle Directive and Landfill Tax has resulted in considerable interest in the use of reclaimed waste such as plastic packaging for construction materials, as well as the use of natural plant fibres, wood, and bio-derived resins and adhesives. An eco-composite may contain natural fibres such as hemp, sisal, jute or flax, or consist of a natural polymer matrix derived from cashew nut shell liquid (CNSL). Plastic materials can also be produced from corn, and even chicken feathers. Eco-composites can be produced from combinations of reclaimed waste such as wood, newspaper, and plastics. Natural composites based on starch can be produced which have the important advantage of biodegradability. Softwood timber can be chemically modified using waste cellulose from agriculture to produce a composite material with the properties of a tropical hardwood. A composite which is easier to recycle such as an all polypropylene material may also be termed an eco-composite.

### Impact of Application

#### **Financial:**

Eco-composites may be produced from cheap raw materials or waste

#### **Environmental:**

Eco-composites may contain natural fibres or resins, reducing need for either petroleum derived plastics or glass fibres.

Eco-composites may be composed of waste material such as post-consumer plastic or newspaper.

Eco-composites may be made to be biodegradable or easier to recycle.

## **Social:**

Some natural fibres and resins are obtained from the Developing World, improving trade with those countries.

Provides a potential alternative crop for farmers.

## **Engineering:**

Certain combinations of natural fibre are lighter than the alternative glass reinforcement, however generally the structural performance of the composite is lower which limits the applications. Plant fibres can be stiffer than glass, however tensile strength and impact resistance are lower.

Plant fibres also do not lend themselves to many of the advanced production processes of polymer composites such as pultrusion

## **Future developments and estimated time-scale:**

High interest in this area of research due to increased pressure for sustainable construction.

## **Where to get further information**

### **websites:**

<http://www.ecocomposite.org/>

International Conference on Eco-Composites  
3-4 September 2001, Queen Mary, University of London,  
London, UK

<http://www.materials.qmul.ac.uk/ecocomp/>

First International Symposium on Environmentally Conscious Design and  
Inverse Manufacturing

1 - 3 February, 1999

Tokyo, Japan

<http://www.computer.org/proceedings/ecodesign/0007/0007toc.htm>

[www.lignopol.com](http://www.lignopol.com)

<http://www.imhotepcomposites.co.uk/recycled.html>

University of Reading, Centre for Biomimetics

<http://www.rdg.ac.uk/Biomim/home.htm>

**Books:**

Recent Advanced in Environmentally Compatible Polymers  
Cellucon 99, Woodhead publishing