large span timber structures.
how to help reduce climate change with wood products.

Use wood instead of other materials
• Every cubic metre of wood used instead of another material saves 0.8 tonne of CO$_2$.
• Wood has the lowest energy consumption and the lowest CO$_2$ emission of any material.
• Wood's thermal insulation properties mean timber frame houses use less energy.
• Wood is renewable and bio-degradable.
• Wood products act as a carbon sink throughout their life.
• Using wood products encourages forestry to expand, increasing the carbon sink effect and reducing the CO$_2$ in the atmosphere.

Use sustainable wood
• Europe's forests are managed to produce sustainable growth. In fact forest cover is increasing annually by an area the size of Cyprus.
• In addition, increasing amounts of independently certified timber are available.

Recycle wood products
• Recycling extends the carbon sink effect of the product.

Recover energy from waste products
• Recovering the energy from wood products at the end of their life, as a substitute for fossil fuels, increases wood's positive carbon effect.

“There has been a noticeable change in attitudes. Timber is once again being used as a structural material”.

Amanda Baillieu — Editor RIBA Journal

More architects are building bigger projects than ever in wood, as new timber technology and engineering expands wood’s structural potential and opens new opportunities to explore the natural organic beauty of this most environmentally friendly building material.

This publication provides a snapshot of some of the larger timber projects recently completed in Europe. For more information on the innovative and sustainable timber products available to architects in the UK, email info@woodforgood.com or visit www.woodforgood.com.

1European Commission’s DG Enterprise, 2003
2UNECE/FAO MCPFE 2003 ‘The State of Europe's Forests 2003'
contents.

2 Sheffield Winter Garden
4 Oslo Airport
6 North Rhine Westphalia Representatives Building
8 Velux Building
10 Eno Library
12 Darlaston Swimming Pool
14 Hanover Expo Canopy
16 South Bank University
18 Auto Carrera
20 Viikki Teaching and Research Farm
22 Hounslow East Underground Station
24 Pohjola Football Stadium
26 Padre Pio Pilgrimage Church
28 Leonardo Bridge
30 Gurdwara Sri Guru Singh Sabha Temple
32 Contact information
Sheffield Winter Garden.

The Sheffield Winter Garden is part of a larger redevelopment of Sheffield city centre. It is a grand urban space for people to walk through – a covered park – designed to be energy-efficient and to provide a model for sustainable urban development. A dramatic statement in glass and timber, it literally breathes life into the heart of the city. The building is nearly 70 metres long and 22 metres wide and rises from either end in a series of steps to a lofty 22 metres over the three central bays. The single glazed building envelope is supported by a composite structure of laminated timber and stainless steel connectors in the form of primary arches and purlins. The arches and purlins are made from glue laminated Larch. Glulam was chosen for its ability to be curved into the required geometry without the need for heavy plant as well as for its excellent surface finish; Larch for its durability, minimal maintenance and maturing pale silvery-grey colour. The largest component was 24m long and 900mm deep.

Architects: Pringle Richards Sharratt Architects
Structural Engineers: Buro Happold
Completed: 2003
Area: 1,500m²
Location: Sheffield, South Yorkshire, UK
Timber Suppliers: Merk Holzbau GmbH & Co KG
Oslo Airport.

The ultimate goal in the construction of this terminal was to create a simple building: a gateway to Norway, showcasing Norwegian architecture, technology and art at its best. Natural and environmentally friendly materials, such as wood, stone and glass are widely used. The main construction is essentially a wooden roof with Glulam trusses resting on concrete columns. The roof and the trusses are not the only place where wood was used. Almost every surface inside the building has elements of wood, from doors and walls to floors and desks.

Architects: Aviaplan AS, Niels Torp Arkitekter, Narud-Stokke Arkitekter & Planleggere, Skaarup & Jespersen Arkitekter

Structural Engineers: Hjellnes Cowi in collaboration with Astrup & Hellern, Calvert & Clark and Bjørkbekk & Lindheim

Completed: 1998

Area: 175,000m²

Location: Gardermoen, Norway

Timber Suppliers: Glulam beams:
Moelven Limtre AS
North Rhine Westphalia Representatives Building.

The most prominent wooden structure in Germany uses a hybrid steel and wood truss system to provide a lightweight and flexible structure, capable of easy adaptation in the future. Wood was chosen for the project because of its enduring good looks and its environmental and economic advantages. The glass façade is carried by the parabola-shaped wooden secondary structure that gives the building its unique character. Windows, behind the glass façade, are wooden and all ceilings above the ground floor are pre-fabricated, hollow-body wood.

Architects: Petzinka Pink Architekten
Structural Engineers: Petzinka Pink Tichelmann
Completed: 2002
Location: Berlin, Germany
Timber Suppliers: Structural timberwork:
Paul Stephan GmbH & Co KG
Velux Building.

Designed for roof window manufacturer VELUX, this is an inventive green landmark building principally of timber. The three-storey facility, with its striking sloping facades, functions both as operational office and visitor centre for the public and construction professionals. The use of geometry and timber acts as a showcase for the company’s products. There are two complementary roof forms constructed from a Glulam framework. They have very different characters: south-facing, a concave sweep of natural slate tiles is visible from all approaches and contains a display of the VELUX range; the convex north-facing roof, clad in cedar shingles, acts as the primary means for daylight to enter the building through more VELUX windows and the clerestory windows that join the two roofs together.

Architects: White Design
Structural Engineers: Buro Happold
Completed: 2001
Location: Kettering, Northamptonshire, UK
Timber Suppliers:
- Structural timberwork: Lilleheden A/S
Eno Library.

Eno is an old wood processing community in northern Karelia, in eastern Finland. It was natural that its local library should be built of timber. The load-bearing frame consists of arched Glulam beams, which meet in the centre of the semi-circular plan. The roof also comprises herring-bone finger-jointed Pine panelling and the floor is finished with 28mm thick finger-jointed birch. Perforated Birch ply on the walls provides the acoustic absorbency necessary for a properly functioning library space. A unique library interior was created using timber.

Architects: Arkkitehtitoimisto Antero Turkki
Structural Engineers: Insinööritoimisto Karrak Oy
Completed: 2000
Area: 600m²
Address: Eno, Eastern Finland
Timber Suppliers: Glulam beams: Late-Rakenteet Oy
WISA-Plywood: Schauman Wood Oy
Darlaston Swimming Pool

The building has an exceptionally large span monocoque roof made possible by the use of Kerto ‘Q’ Laminated Veneer Lumber – an engineered structural timber composite with unique properties. Kerto is made up to 26m long x 1.8m wide with 20% transverse veneers to form large and stable panels. The webs were cut in pairs to achieve the tapered shape with minimal waste. The upper and lower decks (‘flanges’) were 1.8m wide x 21m long. The 4m high wall panels have a stiff connection to the roof to form a portalised structure. Soffits and walls were factory-finished, enclosing 170m$^2$ per pair with no separate lining or top deck contracts. 31 pairs of panels formed the length to cover a plan area of 1,200m$^2$.

Architects: Hodder Associates
Project Engineer: Ove Arup & Partners Consulting Engineers
Timber Engineers: Frank Ward Consulting Engineers Ltd
Completed: 2002
Area: 1,200m$^2$
Address: Walsall, West Midlands, UK
Timber Suppliers: Structural timberwork:
Cowley Structural Timber Work Ltd
Finnforest UK Ltd
Hanover Expo Canopy.

Germany’s World Expo building consists of ten identical, arched roof structures supported by columns. The theme of the World Expo was “Man-Nature-Technology” and timber, with its environmental properties, was a natural choice. The canopy also demonstrates timber’s extraordinary versatility.

Architects: Herzog + Partner BDA, Munich
Structural Engineers: IEZ Natterer GmbH, Wiesenfelden
Completed: 2000
Area: 15,210m²
Location: Hanover, Germany
Timber Suppliers: Structural timberwork:
Merk Holzbau GmbH & Co KG
Finnforest Oyj Kerto
South Bank University.

This building has several notable structural timber innovations. The curtain wall is 33.4m high x 30.1m wide. The mullions and transoms are made from Kerto Laminated Veneer Lumber, stabilised to the building frame by 250mm diameter Glulam props. There are two 6-storey Kerto based pods which serve as rooms for lectures, meetings, coffee etc. standing on Glulam columns at one end and secured to the building frame at the other.

Architects: Building Design Partnership
Timber Engineers: Parkman Ltd
Completed: 2004
Location: London, UK
Timber Suppliers: Structural timberwork:
Cowley Structural Timber Work Ltd
Finnforest UK Ltd
**Auto Carrera.**

Construction in timber provided a competitive alternative for this luxury car showroom. The design has a distinctive character in response to a demanding brief. Originally the space was to have included a suspended ceiling but this was omitted during construction, as the simplicity of the roof’s timber soffit was preferred by the client. It incorporates acoustic material, which, together with the timber frame, provides a pleasant atmosphere for doing business.

**Architects:** Lohman Arkkitehdit Oy  
**Structural Engineers:** Insinööritoimisto Sirapa Oy  
**Completed:** 2000  
**Area:** 600m²  
**Location:** Vantaa, Finland  
**Timber Suppliers:**  
- **Roof elements:** SPU-Systems Oy  
- **Glulam frame:** Late-Rakenteet Oy
Viikki Teaching and Research Farm.

Three new buildings were commissioned for the Helsinki University Teaching and Research Farm: two storage halls and a grain drying plant. The load-bearing roof structure of the storage buildings consisted of plywood web beams combined with small-scale Glulam beams, which offered both an elegant and rigid solution. This turned out to be very cost-effective and also provided a spacious yet practical overall structure, which was achieved without the use of tension bars.

Architects: Arkkitehtuuritoimisto Mauri Maki-Marttunen
Structural Engineers: VM-Suunnittelu Oy
Completed: 1998
Area: 1,080m²
Location: Viikki, Finland
Timber Suppliers: External boarding and Glulam frame:
Vierumäen Teollisuus Oy
Plywood:
Schauman Wood Oy
Hounslow East Underground Station.

This overground tube station was constructed with a free-form two-way spanning roof, using diagrid, a timber system developed by Cowley Structural Timber Work. The base element is an almost square grid with a leg projecting from each corner of the square, using Kerto Laminated Veneer Lumber lamellas in conjunction with decking to stiffen the structure. The structural decking consists of 27mm thick tongued-and-grooved sheets of Laminated Veneer Lumber screwed to the tops of the lamellas.

Architects: Acanthus Lawrence & Wrightson
Structural Engineers: Buro Happold
Completed: 2003
Location: Hounslow, Middlesex, UK
Timber Suppliers: Structural timberwork:
Cowley Structural Timber Work Ltd
Finnforest UK Ltd

Photography by Andrew Postings
**Pohjola Football Stadium.**

The stadium is the first built example of Finnforest’s Silva-Stadium concept. The project was built in order to study and further develop the particular use of Kerto Laminated Veneer Lumber and plywood in stand and canopy structures. By using timber it was possible to meet fire resistance and compartmentation requirements without added costs. The necessary boxing in of steel components for fire safety reasons was achieved using plywood and Kerto timber.

**Architects:** Arkkitehtitoimisto Seppo Valjus Oy  
**Structural Engineers:** Finnmap Consulting Oy  
**Completed:** 1999  
**Area:** 1,780m²  
**Location:** Vantaa, Finland  
**Timber Suppliers:**  
Frame and Kerto LVL: Finnforest Oyj  
Roofing elements and box beams: SPU-Systems Oy
Padre Pio Pilgrimage Church.

The major challenge for a building that receives several hundred thousand pilgrims each year was creating a space that would be open and inviting. This explains why the church was given an immense but low-lying dome shape. The upper beams of the dome are laminated Larch timber.

Architects: Renzo Piano
Structural Engineers: Ove Arup Engineers
Completed: Under construction
Location: San Giovanni Rotondo, Italy
Timber Suppliers: Structural timberwork:
Merk Holzbau GmbH & Co KG
Leonardo Bridge.

Inspired by Leonardo da Vinci’s design for a stone bridge to span the Bosphorus, artist Vebjørn Sand worked together with the architects and structural engineers to make da Vinci’s 500 year-old design a reality. Following the Norwegian tradition of timber bridge construction, three elegant bowed arches made from Glulam timber span the road, supporting each other and carrying the footpath. A new technique for preserving the bright colour of the Norwegian Spruce was developed specifically for the project. The bridge was pre-fabricated in sections and assembled on site in just a few days, creating minimal traffic disruption.

Initiator: Vebjørn Sand, artist
Architects: Selberg Architects
Structural Engineers: Dr. techn. Olav Olsen AS
Completed: 2001
Size: 110m long, 3m wide, with a span of 45m
Location: Ås, Norway
Timber Suppliers: Kerto LVL:
Moelven Limtre AS
Gurdwara Southall Temple.

The dome was originally conceived with the structural frame separated from the deck. This looked good but resulted in some duplication. By fixing 33 mm Kerto 'Q' Laminated Veneer Lumber curved decking panels to the 140 mm x 140 mm Pine Glulam ribs, the structure was made more efficient. This produced significant economies complemented by the use of Cowley Connectors, which simplified the joints. The dome diameter is 18m x 14m radius. Decking panels are 450 wide 'V' groove jointed in single pieces from eaves to lantern. 176 pieces of curved Pine Glulam formed the ribs.

Architects: Architects Co-Partnership
Project Engineers: Buro Happold
Timber Engineers: John Westmuckett, Parkman Ltd
Completed: 2003
Location: London, UK
Timber Suppliers: Structural timberwork:
- Cowley Structural Timber Work Ltd
- Finnforest UK Ltd
Contact information

Glulam and Laminated Veneer Lumber
- Moelven at www.moelven.co.uk
- Finnforest UK Ltd at www.finnforest.co.uk
- Holzwerke Wimmer GmbH at www.wimmer.com (part of the Stora Enso group)
- Cowley Structural Timber Work Ltd at www.cowleytimberwork.co.uk

I-beams
- James Jones Ltd at www.jji-joists.co.uk
- Finnforest UK Ltd at www.finnforest.co.uk

Flooring cassettes
- Södra at www.sodra.com

Plywood
- UPM-Kymmene at www.wisa.com
- Finnforest at www.finnforest.co.uk

The Timber Trade Federation www.ttf.co.uk
For timber suppliers throughout the UK.

The British Woodworking Federation www.bwf.org.uk
The voice of the UK woodworking and joinery industry.

TRADA Technology Ltd www.trada.co.uk
Specialists in timber technology information and research.

UK Timber Frame Association Ltd www.timber-frame.org

The Building Research Establishment (BRE) www.bre.co.uk
A research-based consultancy, certification and testing business.

Glued Laminated Timber Association (GLTA) www.glulam.co.uk