THE IMPORTANCE OF WOOD PRODUCTS AND THE WOOD PRODUCTS INDUSTRY IN EU POLICY MAKING

INTRODUCTION

As already explained, the European wood products sector occupies a prominent position in the European economy. Using wood as its prime raw material, it forms an integral part of the bio-economy and, as such, contributes greatly to achieving the major policy goals the EU has set itself.

Within the context of this exhibition at the European Parliament, focus is put on the sector's raw material use, on the contribution of wood products to the mitigation of climate change, on the achievement of resource efficiency, and on the actions taken by the sector in this respect.

Further information on the various aspects covered is available from the respective industry associations.

A SUSTAINABLE, NATURAL AND GROWING RESOURCE FOR THE EUROPEAN WOODWORKING SECTOR

Europe's forest cover

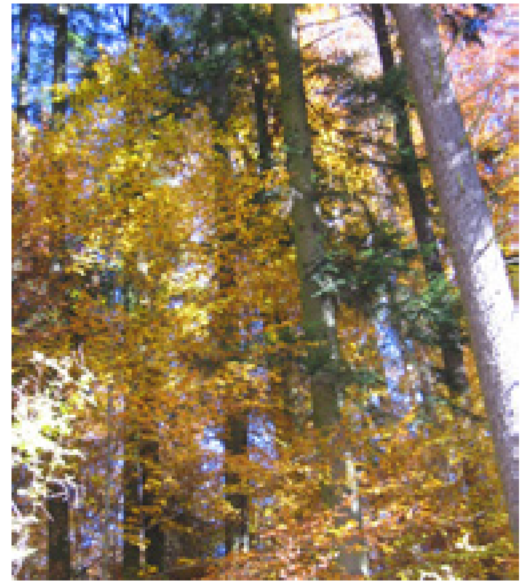
Europe has 1005 million hectares (ha) of forest spread over 46 countries, equivalent to 25% of the global forest and to 1.4 ha (more than two football pitches) per capita. Although the Russian Federation accounts for over 80% of this forest area, EU forest cover averages 45% per country while the 27 EU countries (EU 27) have an average forest cover of 37.6 %, amounting to 157 million ha of forest.

Europe's forest growth

The forest area in all European regions has increased since 1990. Europe is the only region to have had a positive net change in forest area for the past 20 years. Europe has gained 5.1 million ha of forest and other forest land since 2005 and 16.69 million ha since 1990. The total standing volume in Europe in 2010 amounted to 96,252 million cubic metres, 21,750 of which are in EU 27 countries.
The net annual increment of EU 27 is estimated at 620 million cubic metres. In practice just 64% of the net annual increment is harvested.

The basis: sustainable forest management

Due to the wide variety of historical, demographic, economic, climatic and ecological circumstances, different management and regeneration methods are used across Europe – from large scale regeneration felling in uniform coniferous monocultures to group, or even single tree, selection systems in mixed or broadleaved forests. European forestry management is moving towards methods that enhance natural processes and produce authentic forest structures which are environmentally appropriate, socially beneficial and economically viable. More and more often forests are third-party certified for sustainable management practices, FSC (Forest Stewardship Council) and PEFC (Programme for the Endorsement of Forest Certification) schemes being the most prominent among them.



Furthermore, almost 39 million ha or 18% of the European forest area (excl. Russia) are set aside to conserve ecological and landscape diversity. More than 2.3 million ha are strict forest reserves, with no active human intervention. 85-90% of the forest area of Europe is used for economic, recreational, and other multiple-use purposes and also helps to protect the soil, water, and other ecosystem functions, such as biodiversity, air quality, climate change and land stability.

The European forestry industry recognises that its future is inextricably linked with the protection and expansion of its forests. This, coupled with strong and effectively-enforced laws, ensures that more trees are planted than are harvested.

All European countries have policies and practices requiring reforestation. Although the number of trees planted per hectare will vary depending upon the species, site and management system, it will always be more than the number felled, in order to allow for natural losses and for the forest to be well stocked. Therefore there should be no confusion between deforestation in tropical regions, e.g. due to poverty or forest conversion for agricultural purposes, and forest management practices in Europe.

As stated earlier, only 64% of the annual increment of European forests is harvested and the forest area is constantly increasing.

Left entirely to nature, forests will achieve a climax stage. At this point the forest only grows as trees fall due to age, wind, landslip, disease or fire. Although natural regeneration will occur, the dead and dying trees will decay or burn, emitting CO_2 from the stored carbon. Growth is matched by decay and, with no forest management, there is no net increase in carbon storage. Harvesting trees as they mature allows much of their carbon to be stored throughout the life of the resulting wood products, while at the same time giving the industry an incentive to plant new trees in their place.

Sound forest management and use of the wood produced are, therefore, the best guarantee to secure Europe's forests for decades to come and guarantee income for the forest owners, and raw material for the wood industry.

In addition, many European countries are now using green public procurement policies to guarantee that wood and wood products come from sustainable

forest management. It is important to appreciate that over 90% of Europe's wood consumption is sourced from European forests which are characterised as 'generally stable, well managed and in surplus production'. The consumer or specifier can therefore be reasonably sure of the environmental credentials of their product.

With the implementation of the European Union Timber Regulation (995/2010/EC) in March 2013, prohibiting for the first time the placing on the EU market of illegally harvested timber and products derived from such timber, further reassurance will be given to the consumer that wood and wood products found on EU markets are legal.

WOOD AND WOOD PRODUCTS, AND IN PARTICULAR WOOD CONSTRUCTION, HELP THE EU IN FULFILLING ITS POLICY GOAL

MITIGATION OF CLIMATE CHANGE

Basics regarding carbon storage and substitution

There are two ways to reduce CO_2 in the atmosphere: either by reducing emissions, or by removing CO_2 and storing it – reducing 'carbon sources' and increasing 'carbon sinks'. Wood has the unique ability to do both.

Reducing carbon sources

Embodied energy

The energy used to create the materials that make up a building is typically 22% of the total energy expended over the lifetime of the building, so it is worth paying attention to the materials specified, as well as to the energy efficiency of the structure.

There is no other commonly used building material that requires so little energy to produce as wood. Thanks to photosynthesis, trees are able to capture CO_2 in the air and to combine it with the water they get from the soil to produce the organic material, wood.

This process of photosynthesis also produces oxygen; all the oxygen we breathe and on which all animal life relies comes from the photosynthesis activity of plants and trees. So, from every molecule of CO_2, photosynthesis produces two key components essential to life: one atom of carbon, around which all living materials are built, and one molecule of oxygen, on which all life relies.

Substitution for other materials

Not only is the production and processing of wood highly energy efficient, giving wood products an ultra-low carbon footprint, but also wood can often be used to substitute for materials like steel, aluminum, concrete or plastics, which require large amounts of energy to produce.

In most cases the energy necessary for processing and transporting wood is less than the energy stored by photosynthesis in the wood. Every cubic meter of wood used as a substitute for other building materials reduces CO_2 emissions to the atmosphere by an average of 1.1t (tonnes) CO_2. If this is added to the 0.9t of CO_2 stored in wood, each cubic metre of wood saves a total of 2t CO_2. Based on these figures, a 10% increase in the percentage of wooden houses in Europe would produce sufficient CO_2 savings to account for about 25% of the reductions prescribed by the Kyoto Protocol.

Increasing carbon sinks

The carbon cycle

Carbon is present in our environment in a variety of different carbon reservoirs: dissolved in our oceans; in the biomass of plants or animals, whether living or dead; in the atmosphere, mostly as CO_2; in rocks (limestone, coal...), etc.

This carbon is being exchanged continuously between the different carbon sources and sinks in a process called the 'Carbon Cycle'. As most carbon exchanges involve CO_2, the entities commonly known as carbon sinks are really sinks of carbon dioxide – those elements in the cycle able to capture CO_2 and to reduce its concentration in the atmosphere. Each year mankind contributes 7900 million tonnes of carbon to the atmosphere, of which the carbon

sinks absorb 4600 million tonnes, leading to an annual net increase of 3300 million tonnes. This imbalance is so acute that it will not be enough simply to reduce carbon sources, as required by the Kyoto Protocol: carbon sinks will also have to be increased, and one of the simplest ways to do this is to increase the use of wood.

Forests as carbon sinks

Thanks to photosynthesis, the trees in a forest can trap large amounts of CO_2 and store it as wood. Some 0.9t CO_2 is trapped in every cubic metre of wood. The total carbon stored in Europe's forests, excluding the Russian Federation, is estimated at 9552 million t, increasing annually by 115,83 million t, while an additional 37,000 million t, increasing annually by 440 million t, is stored by the vast forests of the Russian Federation.

Managed forests are more efficient carbon sinks than forests which are left in a natural state. Younger trees, in vigorous growth, absorb more CO_2 than mature trees, which will eventually die and rot, returning their store of CO_2 to the atmosphere, whilst most of the CO_2 of the trees harvested from a managed forest continues to be stored throughout the life of the resulting wood product.

Wood products as a carbon store

Wood products are carbon stores, rather than carbon sinks, as they do not themselves capture CO_2 from the atmosphere. But they play an important part in enhancing the effectiveness of the forest sinks, both by extending the period that the CO_2 captured by the forests is kept out of the atmosphere, and by encouraging increased forest growth.

MAKE YOUR LIFE GREENER, CHOOSE WOOD PRODUCTS

There is a very simple way to respect the environment and to preserve it for future generations: simply by choosing wood products one reduces greenhouse gas concentrations in the atmosphere which has great benefits for the environment.

It is imperative that governments and citizens make the greatest efforts to reduce greenhouse gas emissions.

Increases in CO_2 emissions can be offset to an extent by their accumulation in carbon sinks such as forests and other plant biomass. It has also been recognised that wooden materials (harvested wood products) are an important pool of carbon and that they constitute a carbon sink (see e.g. Brown 1998, IPCC 2006, IPCC 2007). Choosing wood products reduces atmospheric levels of greenhouse gases in two particular ways:

- It is well known that trees clean the air by absorbing carbon dioxide (CO_2). But not everybody knows that wood products continue to store much of this carbon, which is kept out of the atmosphere for the lifetime of the product – even longer if the wood is re-used and recycled. Basically, 50% of the dry weight of wood is carbon.
- Manufacturing processes associated with wood products require less (fossil fuel-based) energy and are responsible for far less greenhouse gas emissions than the manufacture of other major building materials. According to research *'substituting wood products for more greenhouse gas (GHG)-intensive building products in cladding, wall, roof and floor framing could reduce the GHG emissions of a typical house by up to 18 tonnes over its life*'.

Until the 17th session of the Conference of the Parties to the UN Framework Convention on Climate Change (COP17) held in Durban, South Africa, in December 2011, the role of wood as a carbon store was not officially recognised. The regulatory framework that resulted from the Kyoto Protocol made it possible to place a value only on emission reductions linked to the utilisation of wood as a renewable energy source. In the Kyoto Protocol – United Nations 1998 – carbon sequestration of wood products is not included as a possible tool for countries to use in meeting their CO_2 emission targets (principle of the default method that assumes instantaneous release of all carbon at the time of harvesting).

However, during COP17, the accounting for forest management and harvested wood products was made mandatory for developed countries. Finally it was clearly recognised that the default assumption was ignoring the reality that carbon is stored for decades in wood products and eliminating a significant portion of the wood product life cycle. Furthermore, it gravely underestimated the role of wood products in reducing GHGs and as part of the solution to mitigating climate change.

Following the Durban decision, the European Commission had the intention of closing the current gap in greenhouse gas accounting in its climate policy and proposed, in March 2012, a harmonisation of the rules to account for forests and agricultural soil emissions across the EU as a first step to incorporating these sectors into the EU's reduction efforts. Through the Durban Decision and the Proposal for a European Decision, Member States will be able to provide incentives to increase sequestration of CO_2 either by increasing the carbon stock in wood products or by using wood as a substitute for more energy-intensive materials.

The proposed European Decision establishes accounting rules for harvested wood products; this will provide an enabling framework for more targeted policies at national and at European level, officially recognising that carbon can be stored for a very long time in harvested wood products (houses, bridges, furniture, paper products). National wood-product inventories would need to be carried out regularly, while annual consumption figures and decay estimates could be used to complement the inventory work. Moreover a reliable monitoring system will help Member States to support and introduce 'wood-first' policies aimed at increasing the pool of harvested wood products.

The substitution of more energy-intensive, non-renewable materials by wood results in substantially lower carbon emissions. Emission differences are due to the fact that a large portion of the energy used in producing wood products is typically produced from wood residues.

Following the adoption of the European Commission Proposal for a Decision, measures should be taken on a national level to effectively bring about recognition of the energy-efficiency-related carbon benefits of wood as compared with other materials.

THE WOOD SECTOR'S CONTRIBUTION TO EC ROADMAP 2050 GOALS

In March 2011, the Commission published a Communication entitled 'A Roadmap for moving to a competitive low-carbon economy in 2050'. This Roadmap builds on the Europe 2020 flagship initiative for a resource-efficient Europe as part of a series

of long-term policy plans in areas such as transport, energy and climate change. The Communication sets out the key elements that should shape the EU's climate action, helping the EU become a competitive low-carbon economy by 2050.

The aim of Roadmap 2050 is to cut greenhouse gas emissions by 80-95% of 1990 levels by 2050 in order to keep climate change below 2°C.

The EC Roadmap 2050 also points to the role of the built environment in achieving the 80% reduction target. The built environment provides low-cost and short-term opportunities to reduce emissions, first and foremost through improving the energy performance of buildings. The Commission's analysis shows that emissions in this area could be reduced by around 90% by 2050, a larger than average contribution over the long term. This underlines the importance of achieving the objective of the recast Directive on Energy Performance of Buildings which stipulates that new buildings built from 2021 onwards will have to be nearly zero-energy buildings.

Efforts will need to be increased significantly over time. Today, new buildings should be designed as intelligent low- or zero-energy buildings. The extra cost of this can be recovered through fuel savings. A greater challenge, however, is the refurbishment of the existing building stock, and in particular the financing of the necessary investments.

Wood and wood-based products have a specific role to play in this context. There is a strong development potential for wood-based constructions in structural and non-structural applications, both for new buildings and for renovation purposes.

The role of wood and wood-based products in providing solutions to EU policy goals has also been recognised by the European Economic and Social Committee (EESC), in an own-initiative Opinion entitled 'Opportunities and challenges for a more competitive European woodworking and furniture sector' (CCMI/088), approved in October 2011.

Policy initiatives on sustainable buildings

The building sector in Europe accounts for:

- 40% of the final energy demand
- 36% of greenhouse gas emissions
- 40% of material consumption
- 33% of generated waste

Because of these impacts, the European Commission is working on a Communication on sustainable buildings connected with its Roadmap on Resource Efficiency.

Existing policies for promoting energy efficiency and renewable energy use in buildings will need to be further strengthened and complemented with policies for resource efficiency, which look at a wider range of environmental impacts across the life cycle of buildings and infrastructure. Significant improvements in resource and energy use during the life cycle – with improved sustainable materials, higher waste recycling, and improved design – will contribute to a competitive construction sector and the development of a resource-efficient building stock.

In this area in particular, wood and wood-based building products and solutions will provide a wide range of opportunities to support the EU in achieving the targets set.

Milestone: By 2020 the renovation and construction of buildings and infrastructure will be made to high resource-efficiency levels. The Life-Cycle approach will be widely applied; all new buildings will be nearly zero-energy and highly material efficient, and policies for renovating the existing building stock will be in place so that it is cost-efficiently refurbished at a rate of 2% per year. 70% of non- hazardous construction and demolition waste will be recycled.

Building materials and constructions - Wood is part of the solution

Using renewable materials with low-carbon footprints and improvements of energy performance of buildings to reduce emissions provides low-cost and short-term opportunities. As explained before, the main opportunities are the storage of carbon in wood and wood products, the potential offered by the substitution of other (energy or carbon-intensive) materials and the efficient eco-cycle of wood products.

Managed forests are more efficient carbon sinks than forests left to grow unmanaged. The CO_2 of the trees harvested from a managed forest continues to be stored throughout the life of the resulting wood product. The wood products' pool may grow either by expanding the usage of wood or by extending the average life span of the products.

The manufacturing of materials for a wooden building uses 28% less primary energy and emits 45% less carbon than the manufacturing of materials for a similar concrete building. The cost of energy used for material processing is lower for the wood-frame building, and the relative energy cost becomes lower for the wood building as climate-related externalities are more fully reflected in the production cost. (*See* Roger Sathre, Leif Gustavsson. 'Using wood products to mitigate climate change: External costs and structural change' in *Applied Energy* 86, 2009, 251–257.)

The European wood industries already provide workable solutions to limit the emission of greenhouse gases, solutions which contribute to achieving the ambitious policy goals of the EU. Wood and wood-based products are, therefore, a first choice for future EU society.

As a flexible and modern engineering material, combining innovative, engineered wood products with new building techniques, wood offers ample opportunities for:

- New housing (residential and non-residential, single- or multi-family housing), prefabricated modules
- Extensions to existing buildings
- Renovation

It is cost efficient to build with wood. The cost of the wood frame is about 30-35 % lower than that of a concrete frame. The total cost is about 10-15 % lower for wood buildings. Using prefabricated modules the total cost is 20-25 % lower.

The time savings can be up to 80% and during the building phase CO_2 emissions can be reduced up to 85%.

Wood offers great potential for changing and modernising existing, older buildings which are often constructed from concrete. It is primarily a matter of extensions to roofs and storeys. This offers a great potential for big cities to increase the number of dwellings on existing ground.

The simplest method is to fit an old building with a new roof designed in such a way that a number of flats can be built into the attic. As timber structures are light, there are also opportunities for additional storeys, e.g. through the use of prefabricated components.

Wood's naturally good thermal insulation properties make it the material of choice in both cold and hot climates. There are thus significant CO_2 savings to be made by using timber in the construction of housing and other buildings, both in terms of embodied energy and in-use energy efficiency.

At the end of their service life, the wood products can in most cases be recycled, thus extending the carbon storage effect, and/or be used as a carbon-neutral fuel, substituting for fossil fuel sources.

BUILDING WITH WOOD: MODERN SOLUTIONS FOR WOOD CONSTRUCTION

There is nothing new about using wood in building structures. Throughout the ages, in those places where forests grow, wood has commonly been used as a building material. The international trade in timber also means that countries with limited availability of forest resources can nowadays have access to wood for building purposes, wood that comes from sustainable and certified forests.

Building with wood is energy-efficient, cost-effective and environmentally friendly. Wood has many benefits as a building material when compared with other materials. Above all it has a low weight in relation to its strength and load-bearing capacity. The material is 'flexible' and can be worked and crafted with simple tools. On top of this, it is a renewable, biological material that is part of the natural eco-cycle. In this way, the use of wood makes a vital contribution to the reduction of the earth's emissions of carbon dioxide. Wood constructions also have significant advantages in severe seismic zones.

Building techniques

Several common techniques are available for constructing buildings with supporting frameworks made of wood. One way is to use structural wood members to form a frame which is covered with structural wood panels. Foundations are generally concrete. This simple building technology is often used in the construction of single-family houses but also in the construction of multi-storey buildings. Another technique is to use solid timber for the supporting framework. Cross-laminated boards are glued together and used to build walls and joists. The walls may need to be insulated to give the building a high level of energy efficiency. The technique is well suited to the construction of multi-storey buildings.

Yet another technique is the system of columns and beams. In this case cross-laminated timber in different forms is used to a large extent for the load-bearing construction. All the framework systems mentioned satisfy modern criteria for fire safety, noise pollution and energy efficiency. Special consideration must be given to these functional criteria in the case of multi-storey buildings. Well tested technical solutions are now widely available.

Building on site

The oldest method is to construct the building on site. The building materials are freighted to the site and the various elements – walls, joists etc. – are put together on site and then erected.

With the on-site building technique, the wall components are generally assembled resting on the joists or the ground and then erected manually.

Off-site prefabrication

Far more common today is the prefabrication of various components: off-site building. Wall parts, floor components, trusses etc. are all built off site at a factory. The components can come prefabricated with insulation, installations, windows and doors. There is a trend towards a higher degree of prefabrication. The advantage of the technique is that the greater part of the building work takes place in an industrial plant in a well-controlled environment with approved quality assurance. The actual assembly of the building, before the roof is put on, takes one or two days at the building site. At one extreme, entire units are manufactured at the factory and in these units not only are electricity, water and waste pipes installed but kitchens and wet rooms as well. Floors are also laid and walls papered.

Another advantage of building with prefabricated components in wood is that these are relatively light and can be erected at heights of several storeys using simple lifting equipment such as mobile cranes, in some cases with the cranes fitted on the trucks that deliver the components to the site.

It is cost-effective to build with wood. The cost of the wood frame is about 30-35 % lower than that of a concrete frame. The total cost is about 10-15 % lower for wood buildings. Using prefabricated modules, the total cost is 20-25 % lower. The time saving can be up to 80% and during the building phase CO_2 emissions can be reduced by up to 85%.

Single-Family Houses

Wood frame is the most frequently used system for single-family houses. It is also common for single-family houses to be built using prefabricated components. This construction method allows for major variations in the design of the houses conforming to national and local building traditions while permitting architectural innovation. To a large extent the design determines the cost of the building and there are also variations here, from deluxe homes to extremely cost-effective single-family houses at prices that are acceptable to the average family. The requirements for fire safety and noise pollution are usually lower for single-family houses than for multi-storey buildings. It is, however, harder to satisfy the demands for low-energy consumption in a single-family house.

Multi-storey buildings

In many countries national building regulations have tended to restrict the use of timber frames for the construction of multi-storey buildings. The reason many countries have refrained from using flammable materials is uncertainty about fires in the buildings. However, extensive research and development has shown that material-neutral building regulations are preferable and for over a decade function-based regulations have been common in many countries. Wood as such burns, but it does so in a controlled manner. It is possible to estimate how much of the cross section will remain unaffected by the fire after one hour of burning and choose material dimensions so that the unaffected part of the cross section has the ability to bear the required load. Steel, on the other hand, loses its entire load-bearing capacity at the temperatures that are produced during a fully developed fire. Non-flammable surface materials and/or sprinklers can be used to ensure safety during the early stages of a fire.

Modern building regulations have contributed to the increase, now taking place, in the construction of tall multi-storey timber buildings of between three and eight storeys. The dramatic increase can be attributed to several important factors. One of these is the lower cost of building compared with construction using other materials. Timber has shown to be the perfect material for use with industrial building methods, enabling costs to be reduced.

Another factor is the growing environmental awareness where the choice is motivated by the fact that timber is a renewable material and that its use reduces CO_2 emissions, provided that the timber is harvested in forests where sustainable forestry is practised, with replanting and management plans.

Another factor worth mentioning is the possibility of building on sites that with heavier buildings, e.g. those made of concrete, would demand extensive and expensive pile foundations. Formerly uncertain or impossible sites can thus be used for lighter timber constructions and therefore with simpler and inexpensive foundations.

The design in terms of horizontal stability is especially important because the construction is relatively light. A common practice for buildings with 6-7 floors is to build the ground floor in concrete and secure the timber structure to the concrete. The load from the wind is transformed via joist elements and shear walls to the ground. Good stability is achieved by utilising diaphragm action. An important consideration when designing multi-storey buildings with a load-bearing wood frame is stability in relation to noise. Effective solutions are now available to prevent sound from spreading between the floors and apartments without putting the stability of the building at risk.

In the same way as with single-family houses, multi-storey buildings made of timber can be given an outer architectural design that suits the location where the building is erected.

Seismic performance

Wood construction has advantages in severe seismic zones. A survey was conducted following the tragic earthquake in China in May 2008. The evidence showed that wood-frame buildings outperformed buildings constructed from other materials. They suffered only minor damage, while many brick-infill walls collapsed and concrete buildings suffered severe damage.

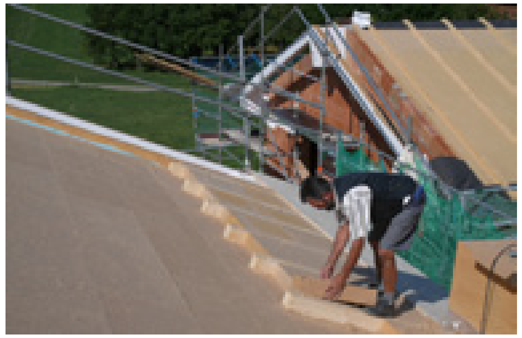
This has also been proved by tests: these show that multi-storey hybrid structures can survive the most severe earthquakes. A full-scale, seven-storey mixed use condominium tower (six wood frame storeys above a one-storey steel structure) was tested in Kobe, Japan. This was the largest full-scale earthquake test in the world. The building was subjected to a quake that was 180% of the Northridge record at Canoga Park. It suffered no significant damage, demonstrating that wood buildings can survive even the strongest earthquakes. Wood construction was also used extensively for the reconstruction of damaged buildings in L'Aquila, Italy, following the devastating earthquake in 2009.

Curtain walls/Infill walls

In many countries infill walls made from timber are becoming an increasingly common solution, together with load-bearing frames made from concrete or steel. External walls of this type are designed only to take the load of the wall component's own weight and the wind loads that directly affect the component.

The component has a low weight and can be prefabricated in a factory, which is a great advantage. Infill walls made of timber have very good insulation characteristics. The increasingly stringent requirements for energy-efficient buildings in various countries are among the main driving forces behind the use of this wall solution.

The component can be clad with an external layer of plaster, brick, wooden panelling or other sheathing material in order to match the building's design and the surrounding buildings. There are two principally different ways of fitting timber frame elements into the steel, concrete or masonry structure. The panels can be fitted either into or partly into the structure, or outside the structure.



Partition walls/Inner walls
Wood frame in combination with board material is a very common solution when it comes to inner walls that will not bear any loads. These walls are used for dividing up rooms but can also be designed so that they can cope with the fire and noise requirements placed on apartment partition walls.

Insulation
Worldwide more energy is used for cooling buildings than for heating them. Based on this, it is reasonable to appraise the efficiency of an insulation product not only for its ability to prevent energy loss in winter months, but also for its protection from heat ingress during the summer months. Wood fibre insulation products provide a low thermal conductivity combined with a high heat storage capacity. In accordance with ISO 10456, wood fibre insulation materials with a value of 2000 J/(kg*K) have by far the best specific heat capacity compared to all commonly used insulation materials. Due to these special features, one can achieve both a comfortable cool environment in summer and a comfortable warm environment in winter.

Extensions
Timber offers great potential for changing and modernising existing older buildings which are often constructed from concrete. It is primarily a matter of extensions to roofs and storeys. The simplest method is to fit the old building with a new roof so designed that a number of flats can be built into the attic space. The space can also be used for placing installations for improving energy efficiency and heat exchangers for ventilation.

As timber structures are light there are often margins for building additional storeys. In such cases, the use of prefabricated components is frequently suitable. Naturally the design must be verified so that there is a margin for absorbing the additional vertical loads and ensuring horizontal stability.

Case-studies
There are both economic and environmental advantages to building with wood. For multi-storey buildings, the construction period can be reduced by up to 80% and the CO_2 emissions by up to 85% using wood.

Comparative research shows that using timber-framed constructions for buildings, instead of concrete or brick ones, is good for the climate. Consider these examples from case studies:

Austria
- Building area with 12 housing units: timber buildings store 300t of carbon while brick buildings produce 54t of carbon emissions.
- Building with 42 housing units: timber buildings store 1205t of carbon while concrete buildings produce 385t of carbon emissions.

Sweden
The carbon balances for two otherwise identical houses, one with a timber frame and the other with a concrete one, have been compared over a 100-year period. The timber-frame house stores 150t of carbon while the concrete frame building has produced 96t of carbon emissions.

United Kingdom
Murray Grove (London), a nine-storey residential building made of cross-laminated timber is currently the world's tallest modern timber residential structure. It took only 24 days with a team of 4 professionals to erect the frame of the structure. The building stores 188t of carbon in its structures. A similar concrete building would have produced 124t of carbon emissions.

Bridport House (Hackney, London), an eight-storey residential building finished in September 2011, constructed entirely from CLT. Had the building had a conventional reinforced concrete frame, the materials required would have resulted in an additional 892t of carbon. This is equivalent to 12 years of operational energy required to heat and light all the dwellings at Bridport House; alternatively it would take 61 years to save the same amount of carbon as the planning requirement of 20% renewables. And when the sequestered carbon locked up in this 1576 m^3 timber structure is added to the carbon avoided through the use of wood, the total figure is 2113t of carbon and this is equivalent to 29 years of operational energy, or in other terms, with 20% renewable energy it would take 144 years to save the same amount of carbon.

Innovation is key to developing the use of wood: an example from IBOIS

Under the leadership of Professor Yves Weinand, interdisciplinary research between the disciplines of civil engineering, architecture, mathematics, and computer science, is providing a breath of fresh air and a surge of new inspiration in the field of timber construction. At the Laboratory for Timber Construction (IBOIS) of the Ecole Polytechnique Fédérale de Lausanne, this research is leading to innovative construction solutions that can be efficiently built and are economically viable – a new architecture of wood.

It is exploring in depth the relationship between engineering sciences and architecture, using wood as the construction material and is seeking to provide construction solutions that can be successfully disseminated throughout the relevant market, meaning that the realisation of non-conventional structures at reasonable cost must be possible. Examining complex geometries from a (timber) construction point of view, not just a morphogenetic one, can signify taking a critical step ahead of blob architecture's 'stylised mode' phenomena. In contrast to the latter, which demonstrate a complete lack of awareness of, or disregard for, sustainability issues, timber construction has a promising future in the face of global sustainable development challenges.

01

02

03

01
This prototype has been constructed with the help of the GEOS software, which was developed at the IBOIS. It permits the generation of geodesic lines on free-form surfaces as well as the data required to cut the timber planks.

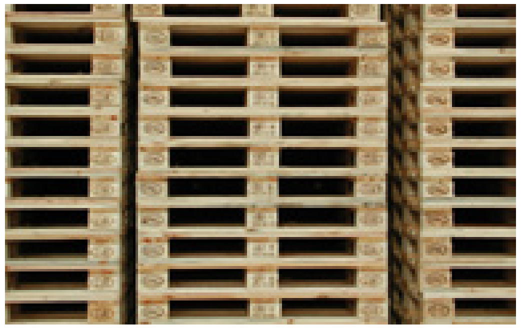
02
The Timberfabric research aims to transfer textile principles and qualities to timber construction. This prototype is composed of three interlaced arches that are laterally connected by additional elements.

03
The implementation of fractal principles allows for the generation of free-form surfaces based on quadrangular facets. The collaboration between architects, engineers and computer scientists led to the development of digital tools for the design and production of such constructions.

RESOURCE EFFICIENCY AND THE PRINCIPLE OF CASCADE USE

Producing more value with fewer inputs: the woodworking industries lead the way

The EC Roadmap to a Resource-efficient Europe is one of the main building blocks of the resource efficiency flagship initiative. The Roadmap sets out a framework for the design and implementation of future actions. It proposes ways to increase resource productivity and decouple economic growth from resource use and its environmental impact and illustrates how policies interrelate and build on each other.



Recently the World Wildlife Fund's Living Planet Report has showed that '*humanity currently consumes the natural resources of 1.5 Earths, 50% more than our planet can sustain. In a business-as-usual scenario, by 2030 we will consume resources to the equivalent of 2 Earths and nearly 3 Earths by 2050. In less than 50 years Europe has doubled its demand for resources and today it consumes the equivalent of 2.6 Earths*'.

In order to meet their huge need for resources, Member States are required to develop policies to maintain a balance between supply and demand for natural resources. Moreover they will have to find solutions in order to produce more value with fewer inputs. New policies will have to be designed so as to support the shift towards sustainable growth via a resource-efficient, low-carbon economy.

The simplest way to produce more value with fewer inputs in order to lessen our impact on the environment is exemplified by the principle of the cascade use of wood. Applying this, the woodworking industries clearly contribute to achieving the goals proposed in the European Roadmap to a Resource-efficient Europe and to transforming Europe's economy into a sustainable one by 2050.

Resource efficiency means using the Earth's limited resources in a sustainable manner while minimising impacts on the environment. The cascade use of wood is based on the efficient use of this natural raw material: manufacturing of wood products, reuse, repair and recycling, as well as the final valorisation of energy content.

This concept was emphasised in the Opinion of the European Economic and Social Committee entitled 'Opportunities and challenges for a more competitive European woodworking and furniture sector' (October 2011).

At the same time, the EESC expressed concern over the *'impact that the Commission's Climate Change and Energy Package will have on the development of renewable energy sources and on the overall availability of wood, the industry's raw material. The EESC is disappointed that the use of inappropriate subsidy schemes for renewable energy production, which were set up to achieve the climate commitments, has made it more profitable to burn wood directly than to use it for products*'.

The UNECE (United Nations Economic Committee for Europe)/FAO European 'Forest Sector Outlook Study II' estimates a 3.5% annual growth rate for wood energy such that by 2030 the wood supply required to satisfy corresponding renewable energy demand will have to double from 435 million m^3 in 2010 to 860 million m^3 in 2030. Unfortunately this approach cannot be considered sustainable in the current policy context.

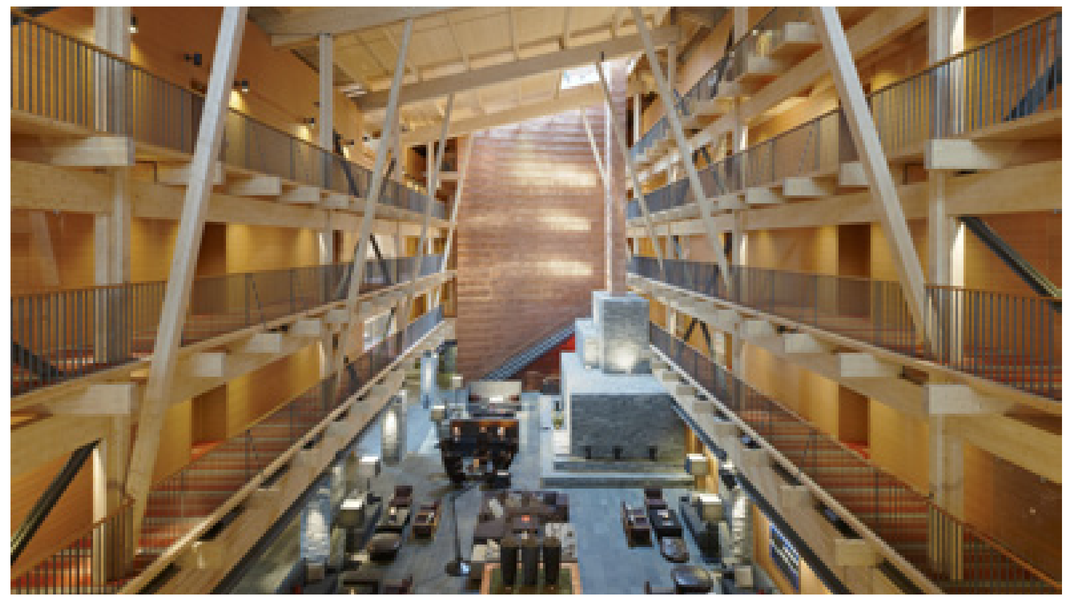
Instead, wood ought to be used for its highest value before being converted into energy, thus observing the value-added and usage chains of wood. Wood can be used, reused and recycled several times but it can only be burned once. The woodworking industry is not opposed to the use of wood as a renewable energy source – in fact it is one of the major users – but this should only be done when no other industrial uses are possible any longer and by preference in highly efficient systems, such as combined heat and power.

In a new study entitled 'Wood Flows in Europe (EU27)', Professor Udo Mantau (Head of the Centre of Wood Science and project coordinator at the University of Hamburg) has examined the importance of the application of the cascade use of wood principle in order to guarantee a sustainable and efficient use of raw wood sources. The study reports that '*in the market process wood is used in cascades. A cascade use is defined as multiple use of the wood resources from trees by using residues, recycling (utilisation in production) resources or recovered (collected after consumption) resources. The more often by-products and recycling products are used, the higher the cascade factor gets. If only wood resources from trees and no other wood resources are used, the cascade factor is 1.00.*' It is important to note that according to the cascade factor defined in this Wood Flow study, '*wood is used 1.57 times (cascade factor including energy use), almost all the cascade uses take place in the wood-based industries'* (1.35).

Wood is a valuable resource and the woodworking industry is committed to using it in the most efficient way. In the last two decades, the sector has developed logistical networks for collecting and recovering recycled wood. However, in several Member States, valuable wood resources are sent to landfill which is counter to the objectives of the European Landfill Directive (1999/31/EC).

Each year, the wood industry produces 169 million m^3 swe (solid wood equivalent) of finished products. One third of this volume is recovered and recycled annually.

The issue of sustainable and efficient use of wood is also at the core of the discussion within the FAO/UNECE Timber Committee. During a Policy Debate on Wood Energy in May 2012 the following recommendations were made:



Recommendations of the UNECE/FAO Timber Committee:

To develop clear definitions of wood for energy along the supply chain that reduce the risk of negative environmental impacts and unfair competition for fibre with other industries.

To embrace the cascade principle for wood utilisation, requiring efficient use of wood for material manufacturing and energy generation, only burning wood in the late part of its cycle once use has been maximised.

To identify and distinguish between various wood energy feedstocks based on full Life-Cycle Analysis. To support the use of wood energy generated only from the most efficient feedstock based on net energy generation and GHG emissions.

To remove financial incentives for low-efficient uses of wood energy and revisit current subventions for wood energy that create ineffective market competition.

Considering the importance of the sustainable and efficient use of wood, the woodworking sector is keen to co-operate with national and European authorities in order to develop guidelines for the most efficient use of renewable solid wood biomass and to guarantee the best use of wood resources. In particular, the woodworking industries welcome the proposal made by the European Economic and Social Committee to set up an inter-institutional expert group on 'wood as a sustainable raw material'.

THE LIFE CYCLE OF WOOD

Wood is a unique material characterised by its ability to store carbon on the one hand and to produce oxygen on the other. The longer wood is used and re-used, the longer it stores carbon.

1. The life cycle of wood starts in the forest, where **young trees** take **CO_2** from the atmosphere. The carbon is stored in the wood through photosynthesis and **oxygen** is **released** into the atmosphere.

2. Once the tree is fully grown, it is harvested and sawn into pieces. The larger parts are transported to the sawmill where they are **processed into planks and beams.** These planks and beams are used in numerous sectors, e.g. construction, furniture production, packaging, transport, etc. As such wood gives **oxygen to the creativity of architects and designers, but to our economy too.**

3. The smaller branches and remainder of the processing in the mill are **ground and compressed into wooden panels** (boards, MDF, OSB) to be used primarily in the construction and furniture sectors.

4. At the end of the life cycle of wooden products, non-recyclable wood residues and clean wood residues are separated. The clean wood residues are ground and recompressed into panels to start a **second life. The cycle is closed.** In many cases, several 'life cycles' are possible.

5. Wood residues that can no longer be re-used or recycled may serve as a **carbon-neutral fuel.** It is only upon burning that wood releases the stored quantity of CO_2. Modern incinerators transform non-recyclable wood into a 'green' kind of **energy production**, as an alternative to fossil fuels.

6. Increasing wood consumption stimulates the forest-based industries to plant new trees and to sustainably manage the forests. In Europe for instance more trees are planted than are harvested.

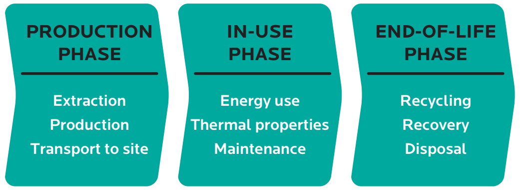
LIFE-CYCLE ANALYSIS (LCA) AND ENVIRONMENTAL PRODUCT DECLARATION (EPD) - TOOLS FOR TACKLING CLIMATE CHANGE

Life-Cycle Analysis

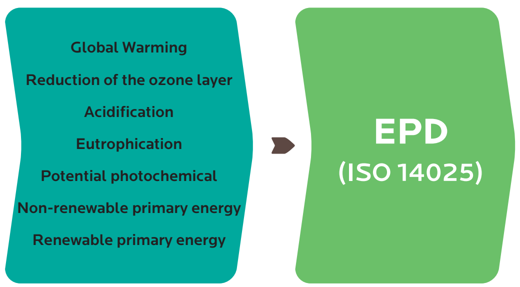
Large distributors who are in direct contact with the end-consumers have recognised the importance of the positive impact of wood products on the environment. It is thus becoming more and more common for them to support implementation of good environmental practices throughout the supply chain, Sustainable Forest Management (SFM), and compliance with all legal requirements including certification and standardisation based on a greater commitment to strict social and environmental criteria.

The role of wood-based products in tackling climate change has a special relevance, which is increasingly recognised by governments. There is a need to develop strategies to support positive influences of the wood-based products on the environment. Therefore, understanding the amount of greenhouse gases (GHGs) emitted during a product's life cycle is a key aspect to consider. Life-Cycle Analysis (LCA) is one of the main tools used to assess such GHG emissions and other environmental impacts. The woodworking sector is starting this analysis from a privileged position because wood stores natural carbon during the entire lifetime of wood products.

LCA is a technique that assesses the environmental impacts of a product throughout its life. It is becoming increasingly important as more and more specifiers are required to consider the environmental impacts of the products and materials they select, taking into account where the material comes from, how it is used or converted into a product and, finally, its use in a building, right through to its disposal or re-use/recycling. It considers the impact of a material or product's use during three specific phases.



This approach cannot always be used to compare materials or products from different countries, many of which have different climates, energy generation sources, ways in which they are designed, building codes, infrastructure, political influences and building methods, some of which will have a bearing on LCA and Whole Life Cost information.



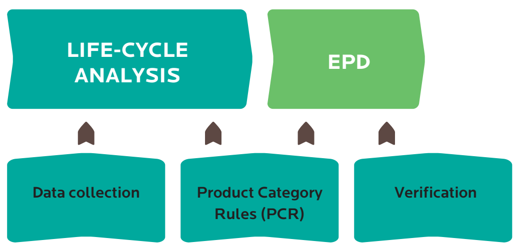
Environmental Product Declaration

Today the global market increasingly demands science-based, verified and comparable information about the environmental performance of products and services. The demand comes from several market places, such as the raw material supply chain, product development and green (public) procurement. Environmental Product Declarations (EPDs) are one of the potential tools to meet this demand. They are intended to help and support organisations to communicate the environmental performance of their products (goods and services) in a credible and understandable way.

An EPD provides relevant, verified and comparable information on a product's environmental impacts throughout its life cycle, taking into account seven parameters:

Environmental Product Declarations (EPDs):

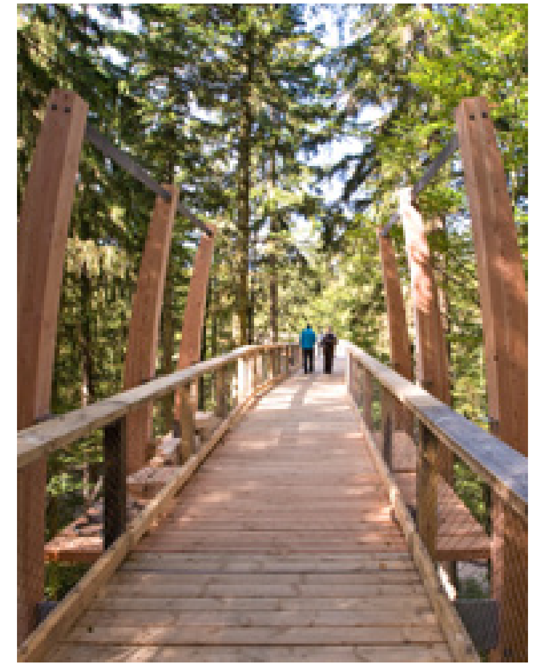
- are based on ISO standards. They are suitable as proof of environmental claims in the public procurement arena.
- offer the relevant basic data on environmental properties of a product for sales and marketing purposes.
- form the basic presentation of data for assessing buildings on an ecological level. This is currently laid down in the new European Standards project 'Sustainability of buildings'. An EPD could be an efficient tool to communicate the positive role that wood products play in tackling climate change. EPDs could also allow the comparison of wood with other (construction) materials.
- give quantitative information about the different environmental impacts.
- synthesise relevant information on the environmental profile of a product.
- are multi-criteria assessments, including carbon footprint.
- are based on LCA and verified by an independent third party. This LCA has to follow the relevant Product Categories Rules (PCRs).



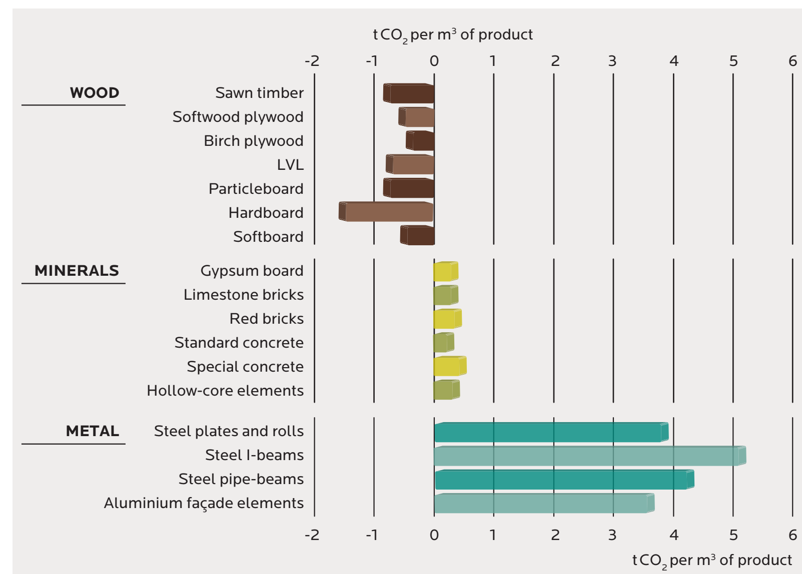
EPDs in Eco-Building Schemes

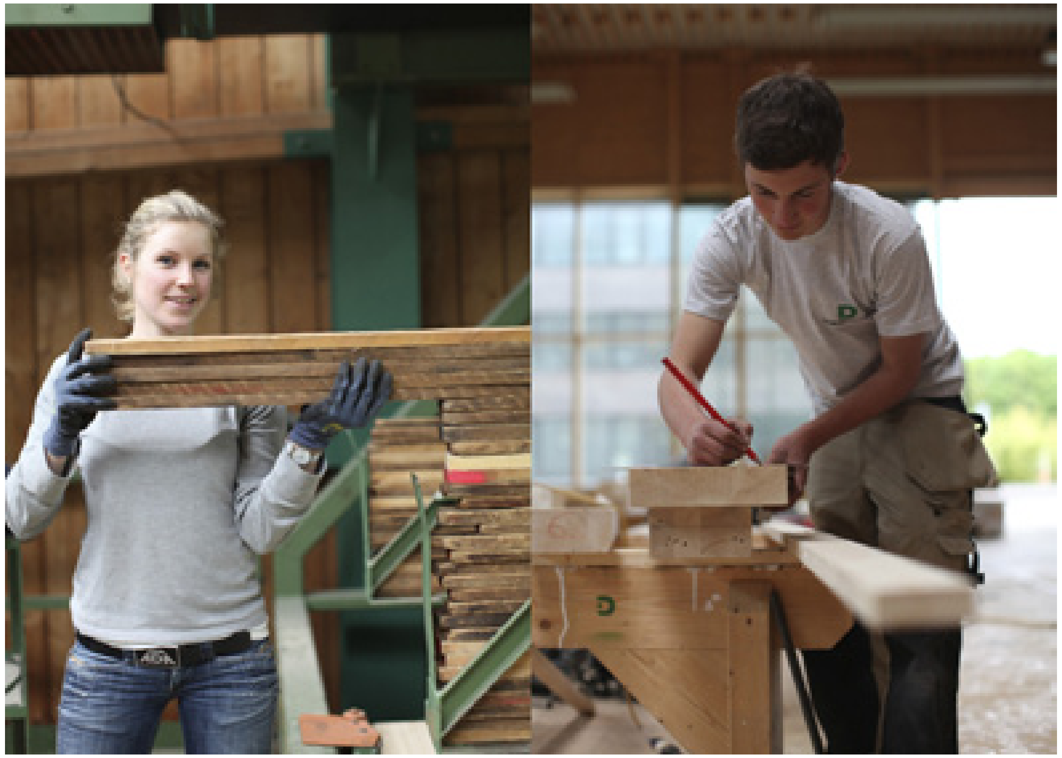
One of the main uses of wood-based products is construction. Their contribution to the global environmental impacts of a building thus has to be assessed. The estimated contribution also has to be comparable to the estimated contributions of other construction materials. ISO 14025 – '*Environmental labels and declarations - Type III environmental declarations - Principles and procedures*' and ISO 21930:2007 '*Principles and requirements - Type III environmental declarations of building products*' provide a framework to state the environmental performance of construction products in a way that helps to assess the entire building.

Resource consumption and environmental emissions are recorded throughout the entire manufacturing process. The resulting contributions to climate change, eutrophication and acidification can be quantified and assessed by LCA methodology. LCA also provides a systematic and standardised tool to make the ecological assessment of a building in the 'modular construction system' on the basis of individual building product declarations (statements). In an LCA, the entire life of a building, the construction phase with possible conversions as well as demolition and disposal stages, are taken into consideration. The contribution of the building products to energy efficiency and other aspects of sustainable management is also evaluated.



Net CO_2 Life-Cycle emissions





THE SOCIAL DIMENSION

The European woodworking industries are a major employer, in particular in rural areas. They play an important role in the social development of people and regions.

At the European level, this social dimension is reflected in the European sectoral social dialogue the woodworking sector has been conducting with the European Federation of Building and Woodworkers (EFBWW) since the mid 1990s.

This dialogue has resulted in a number of joint positions of the social partners and projects aimed among others at improving the wellbeing of workers in the workplace. Recent actions have focused on establishing best-practice guidelines targeted at limiting the exposure of workers in the workplace to wood dust and formaldehyde. These projects were carried out with financial support from the European Commission and will now be continued in a 2nd phase.

A worrying development for both the employers and employees is the growing average age of the workforce in this sector. For several years now it seems it has become most difficult to attract young people to start a career within the sector, or even to take up education that leads to a profession in woodworking.

In its recent own-initiative Opinion on the woodworking and furniture industries, the EESC has also expressed concern about this situation and has called on the sector and public authorities alike to look at measures to remedy it in the future, e.g. through better education and training.

As a first action, the social partners plan a joint study to assess the current situation in the various EU Member States with a view to developing a target action plan.

A unique sculpture at The Vrouw Moeder Kind Centrum

A unique sculpture has been erected at The Vrouw Moeder Kind Centrum, a hospital health centre for mothers and newborn babies in Veldhoven in The Netherlands. An MDF manufacturer joined forces with The Fiction Factory to build a 6-metre high model kangaroo. It is hoped that the installation will enhance the positive experience for sick children when they visit the centre. The wood material was chosen for its durability, longevity and versatile design features. A novel technology makes it possible to use dry process fibreboard (MDF) in exterior applications.

The 111-piece model takes the shape of a kangaroo with its young sitting in the pouch. The symbolic sculpture portrays the intense bond between parent and child in a safe and soothing environment, and is intended to welcome, inspire and calm visitors. The kangaroo, made from “Extreme Durable MDF”, painted in Netherlands Orange, can be recognised from several levels of the building and from various points on the ground floor. The plan is that it will be in place for at least 5 years.

OUR CONTRIBUTORS

SCHWEIGHOFER PRIZE

Innovation Award For The European Forest-Based Sector

The Schweighofer Prize awards innovative ideas, technologies, products and services in order to strengthen the competitiveness of the European forest-based sector.

The Schweighofer Prize is donated by the Austrian Schweighofer family, who has been engaged in the European woodworking industry for generations. Since 2003 the award is presented every second year, and is endowed with a total prize money of € 300,000, which is divided between one Main Prize and several Innovation Prizes.

The Main Prize pays tribute to people or organisations that play an important role in the European forest-based sector. The Innovation Prizes serve as a catalyst for innovative projects during the early stages of implementation.

The jury of the Schweighofer Prize are particularly looking for nominees with innovative contributions to the European forest-based sector including applied research and development projects. Collaboration between science and industry would also be well regarded.

www.schweighofer-prize.org

The 6th call for submissions is open from 1 November 2012 to 4 February 2013. Application are accepted ONLINE ONLY under www.schweighofer-prize.org

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3-7 December 2012
European Parliament, Brussels

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