Tackle Climate Change:
Use Wood

Introduction

Wood is an extraordinary material. Naturally renewable, it grows in ever-increasing abundance in Europe.

It is beautiful, light and strong to build with, warm and welcoming to live with.

And it offers a simple way to reduce the CO_2 emissions that are the main cause of Climate Change, through:

• the carbon sink effect of the forests
• the carbon storage effect of wood products
• substitution for carbon-intensive materials.

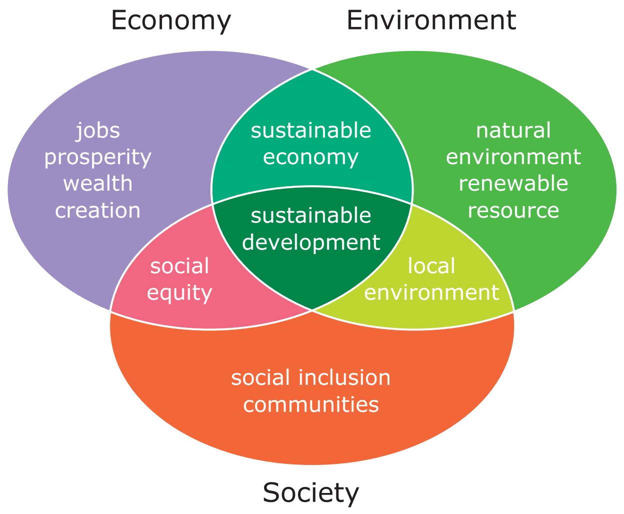
The purpose of this book is to set out the environmental arguments for using wood as one way of reducing Climate Change, at the same time as putting the industry's economic contribution in context.

"It has been estimated that an annual 4% increase to 2010 in Europe's wood consumption would sequester an additional 150 million t CO_2 per year and that the market value of this environmental service would be about €1,8 billion a year."

CEI-Bois, Roadmap 2010, Executive Summary, 2004

While the European timber industry recognizes the importance of the sustainable 'triple bottom line', where long term economic development must be balanced against the need to respect the environment and the interests of society as a whole, setting universal targets is impossible, given its diversified and fragmented structure across Europe.

However, the main issues have been recognized and are being addressed. These, in common with most industries, include the health of the workforce, safety at work, a reduction in sick leave, flexible working hours, training, gender equality, Corporate Social Responsibility, impact on local societies, ecological impact and environmental impact.



Below

The industry recognizes the triple bottom line of sustainable development

Index

1 Climate Change

The effects are already evident

CO_2 emissions are the main cause

Wood can reduce CO_2 sources

Wood can increase CO_2 sinks

CO_2 emissions are the main cause

The greenhouse effect

The term 'greenhouse effect' refers to the way infrared radiation from the Earth is trapped, heating up the atmosphere.

Solar radiation reaches the Earth through the atmosphere and warms its surface. The stored energy is then sent back to space as infrared radiation. However, as it is less powerful than the incoming radiation, it is increasingly unable to cross the barrier of specific atmospheric gases known as greenhouse gases.

The most important greenhouse gas is carbon dioxide (CO_2), but others include steam (H_2O), methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs) and sulphur hexafluoride (SF_6).

It is important not to confuse the natural greenhouse effect, without which the Earth's mean temperature would drop from around 15°C to −18°C, with the contribution mankind is making to intensifying the effect, largely through rapidly increasing CO_2 emissions.

Global Warming

Since the start of the industrial revolution there has been a sharp increase in greenhouse gas emissions into the atmosphere, mainly due to CO_2 from the burning of fossil fuels, but also from tropical deforestation.

As a result, mean temperatures are expected to rise at a rate of 0,1 to 0,4°C per decade during the first half of this century[1].

Most (55-70%) of the additional greenhouse effect is caused by CO_2. Growing by 0,5% a year, according to the most optimistic estimates, the concentration of CO_2 in the atmosphere will double by 2100[2].

Below

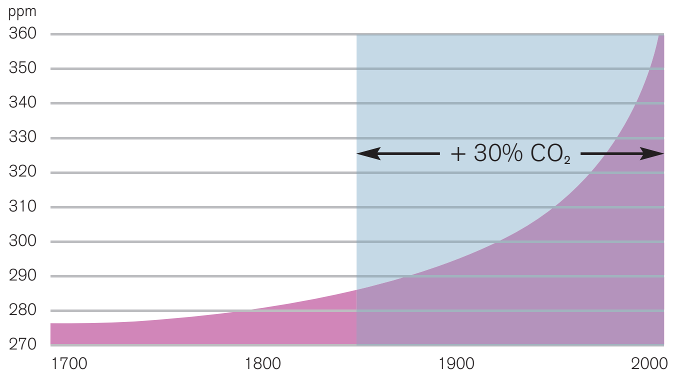
CO_2 emissions are largely due to the burning of fossil fuels

Opposite above

CO_2 concentrations in the atmosphere have increased by 30% since the middle of the 19th century

Swedish Forest Industries Federation, Forests and the Climate, 2003

The increasing concentration of CO_2 in the atmosphere



The first effects

There is no longer any doubt that the climate is changing, or that this change is amplified by human activity. According to the latest report of the IPCC (Intergovernmental Panel on Climate Change), the 20th century was the warmest since records began, the '90s the warmest decade, 1998 the warmest year.

The first effects have already been clearly documented and point the way to much more widespread and destructive changes in the future:

- the North Pole ice cap is melting: between 1950 and 2000 its surface has diminished by 20%[3]
- global sea levels have already risen by about 15cm in the 20th century alone[1]
- all over the planet, snow cover is retreating and glaciers are melting
- there is a significant increase in the frequency and severity of natural disasters such as hurricanes, droughts, earthquakes and floods, tragically borne out by events in the first years of the 21st century.

The forecast effects

The effects of climate change are difficult to forecast because of the complexity of the various interactions of the Earth's ecosystem. However, several significant trends can be deduced from studies so far:

- sea levels will continue to rise, with catastrophic results for those living in coastal or river delta areas, or on low-lying land
- changes in natural habitats will result in the loss of plant and animal species
- according to the World Health Organization (WHO), a temperature rise as small as 1 or 2°C could enable mosquito species that carry tropical diseases such as malaria and dengue fever to spread and settle into new areas north of their present distribution range.

Opposite

There is an increasing incidence of natural disasters caused by extreme weather

Above left

Hurricane force winds are becoming more powerful and more frequent

Above right

Snow cover is retreating and glaciers are melting

Cutting CO_2 emissions

At least 60% of climate change can be attributed to CO_2 emissions resulting from human activities - mostly the burning of fossil fuels, which contributes 6 billion tonnes of carbon emissions annually[2].

Just to contain CO_2 concentrations in the atmosphere to their current levels would require a reduction in global emissions of more than 40%.

As 85% of the energy necessary to run our societies comes from fossil fuels, a reduction in emissions of this order would involve politically unacceptable cuts in our energy consumption.

In short, the efforts necessary to stabilize the concentrations of greenhouse gases are not consistent with our current vision of development based on a steady increase in global consumption.

The Kyoto Protocol

The Kyoto Protocol, agreed in 1997, was a significant step in tackling climate change, providing agreed legally binding targets for the first time.

As an initial stage, industrialized countries were to cut their greenhouse gas emissions to an average of 5,2% lower than their 1990 levels.

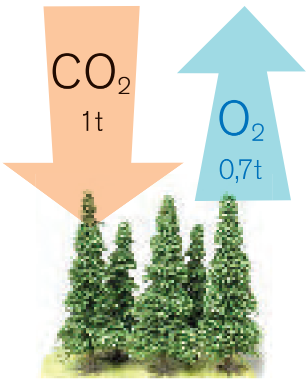
However, to make the Protocol enforceable, it had to be ratified by enough industrialized countries to account for at least 55% of global CO_2 emissions. The United States, which accounts for 36,1%, refused to sign and later withdrew from the treaty altogether. It was only when Russia, responsible for 17,4%, became the 141st party to the Protocol, that the way was clear for it to come into force on February 16, 2005.

Opposite

The burning of fossil fuels contributes 6 billion tonnes of carbon emissions a year

Wood and CO_2 reduction

The photosynthesis effect of tree growth



1m³ growth

Opposite above

Growing trees absorb CO_2 and produce O_2. On average a typical tree absorbs, through photosynthesis, the equivalent of 1 tonne of carbon dioxide for every cubic metre's growth, while producing the equivalent of 0,7 t of oxygen
Edinburgh Centre for Carbon Management

Opposite below

Wood's thermal efficiency means timber buildings save energy and CO_2

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[4], 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 animal 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 wood can often be used to substitute for materials like steel, aluminium, 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 metre of wood used as a substitute for other building materials reduces CO_2 emissions to the atmosphere by an average of 1,1 t CO_2. If this is added to the 0,9 t of CO_2 stored in wood, each cubic metre of wood saves a total of 2 t 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[5].

Thermal efficiency

Using wood also helps to save energy over the life of a building, as its cellular structure provides outstanding thermal insulation: 15 times better than concrete, 400 times better than steel and 1 770 times better than aluminium. A 2,5cm timber board has better thermal resistance than an 11,4cm brick wall[6].

As a result, wood is becoming an ever more competitive solution to the increasing thermal demands of European building regulations.

Substitution for fossil fuel energy

When wood cannot be re-used or recycled, it can still produce energy through combustion. The energy produced is effectively stored solar energy.

As the amount of CO_2 emitted from combustion is no more than the amount previously stored, burning wood is carbon neutral, a fact well understood by the wood industry which derives up to 75% of the energy it uses to process wood from wood by-products.

Below

Every year 3,3 billion t C are added to the atmosphere

UN Intergovernmental Panel on Climate Change, May 2000

Opposite left

The total carbon stored in Europe's forests is an estimated 9 552 million t C

Opposite right

The total carbon stored in Europe's wood products is an estimated 60 million t C

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, what are 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 7 900 million tonnes of carbon to the atmosphere, of which the carbon sinks absorb 4 600 million tonnes, leading to an annual net increase of 3 300 million tonnes[2].

The global carbon balance

	Billion tonnes of carbon annually
Emissions	
Combustion of fossil fuels	6,3
Deforestation in the tropics	1,6
Total	7,9
Absorption	
Seas & lakes	2,3
Afforestation & increased biomass	2,3
Into the atmosphere	3,3
Total	7,9

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 increase carbon sinks is to increase the use of wood.

Forests as a carbon sink

Thanks to photosynthesis, the trees in a forest can trap large amounts of CO_2 and store it as wood. Some 0,9 t 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 9 552 million t C, increasing annually by 115,83 million t C, while an additional 37 000 million t C, increasing annually by 440 million t C, is stored by the vast forests of the Russian Federation[7].

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, while 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 take 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.

With an estimated European wood product stock of some 60 million t C, the carbon storage effect of wood products has a significant role to play in reducing greenhouse gases[5].

The 0,9 t CO_2 stored in a cubic metre of wood continues to be kept out of the atmosphere throughout the initial life of a wood product and then beyond, through re-use and recycling (for instance as wood panels or reconstituted wood), to be finally returned to the atmosphere through incineration for energy, or decomposition.

According to recent estimates, the average life of wood products varies between 2 months for newspapers and 75 years for structural wood. The longer, the better for the environment, not least because it makes better use of forest resources, but also because it reduces the energy necessary for replacing the products concerned.

However long the CO_2 remains stored in the wood, any increase in the global volume of 'wood storage' will reduce the CO_2 in the atmosphere. So increasing the use of wood is one simple way of reducing climate change.

Opposite

Europe's forests grow by the equivalent of nearly one wooden house a second

Above left

Using wood makes a positive contribution to maintaining and increasing forests

Above right

Over 90% of all wood used in Europe is sourced from European forests

The role of wood products in supporting forests

Contrary to the commonly held belief that there is a direct causal link between using wood and the destruction of forests, increasing the use of wood makes a positive contribution to maintaining and increasing forests.

Clearly there is a distinction to be made between tropical or sub-tropical forests and temperate forests. In the former, forest cover is indeed being reduced, for a number of reasons linked to population growth, poverty and institutional deficiencies. However, increasing wood use is not a contributory factor. On the contrary, it creates a market value for the forests which is a powerful incentive to preserve them.

As far as temperate, and more especially European forests, are concerned, the situation is completely different. Europe's forest cover is increasing by 510 000 ha every year and only 64% of annual growth is harvested[8]: the amount of wood available in Europe is growing continuously, as a result of under-harvest on the one hand, and the increase in forest cover on the other.

In Europe (even without Russia), the standing volume of forest is growing by 346 million m^3 every year[9], almost the equivalent of the wood needed for a single family wooden house every second. This means that very little needs to be imported into Europe, with over 97% of softwood, and over 90% of all wood used in Europe being sourced from European forests.

The European forest-based sector is well aware that its own future is linked to the future of its forests. This, together with regulations requiring the reforestation of harvested trees and the development of certification schemes, gives the stability needed in order for the forests to continue to thrive.

The saying that 'a forest that pays is a forest that stays' may be a simplification, but it illustrates a simple truth: a forest's survival depends, broadly speaking, on its value to the local community.

As was noted during the Earth Summit of Rio in 1992, conserving tropical forests is more often considered by the countries concerned as an obstacle to their own development than an ecological necessity. In providing energy, arable or pasture land, or simply more space, deforestation is frequently seen as a solution rather than a problem.

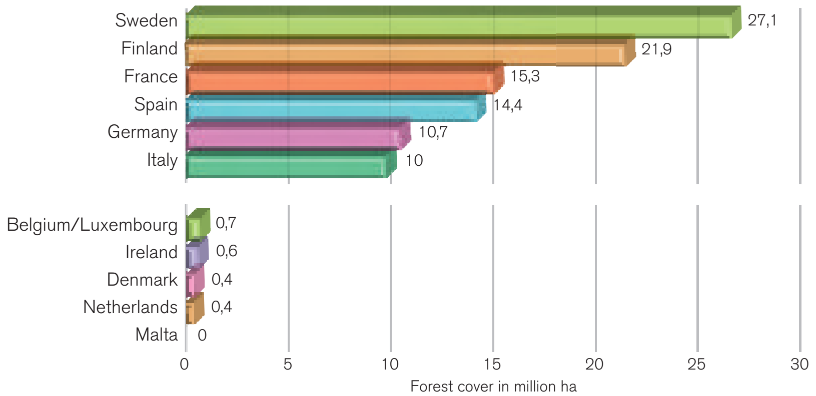
Developing a market for wood helps owners and governments to see forests in a different way, recognizing their contribution to local and national economies. As soon as the prosperity of a local community is seen to be associated with the presence of a forest, the principles of sustainable management begin to be respected.

Europe's forests: a renewable resource

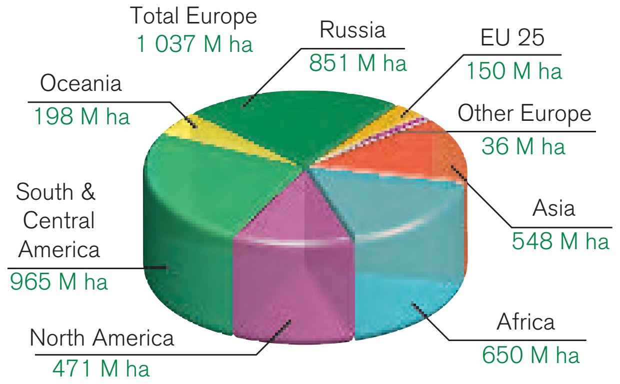
- Forests are growing
- EU forest cover approaching 50%
- Potential to increase annual harvest
- Sustainably managed
- Leading the way in certification
- One of Europe's success stories

Europe’s forests are growing

Europe’s forest cover



Global forest cover



Opposite above

Europe’s forest cover

VTT Technical Research Centre of Finland

Above left

The most and least forested countries within the EU 25

FAO 2003

Above right

Forest cover by continent (total 3 869 million ha)

Below right

Europe’s forests are expanding annually by 510 000 ha

The global context

Globally, forests are an immense resource, accounting for 29,6% of the Earth’s total land base[8].

Although European forests, excluding Russia, account for just 5% of that area, they are the most intensively managed in the world, providing 12% of current global round wood fellings and 23% of industrial round wood[10].

The European forest sector’s output is about 25% of current world industrial production of forest products, accounting for almost 30% of wood-based panels, paper and paperboard[11]. Despite the increasing demand for forest resources, the EU has become a net exporter of forest products, while at the same time expanding Europe’s forests.

Europe’s forest cover

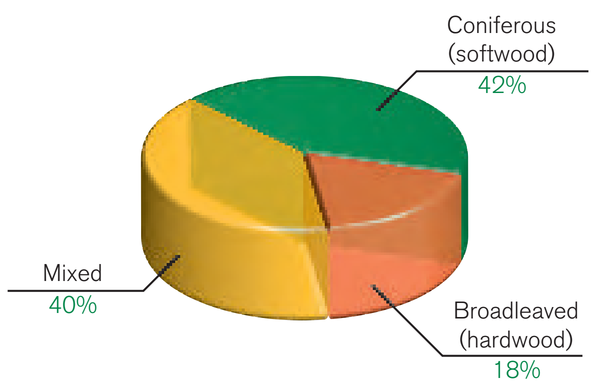
Europe has over 1 000 million ha of forest spread over 44 countries[12], equivalent to 1,42 ha (more than two football pitches) per capita.

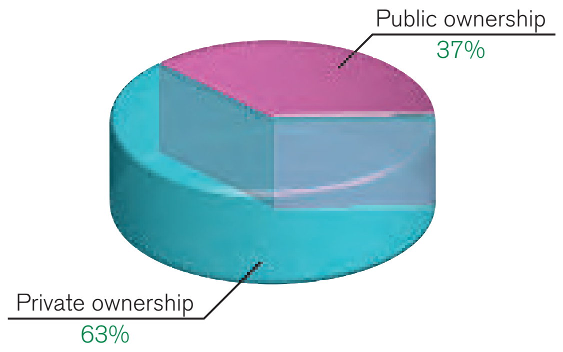
Although the Russian Federation accounts for over 80% of this forest area, EU forest cover averages 47% per country[12], while EU 25 countries have an average forest cover of 36%, amounting to 149,5 million ha of forest.

Europe’s forest growth

Europe’s forests are expanding at an annual net rate of 510 000 ha. The total standing volume is 20 000 million cubic metres[13], producing an estimated 346 million cubic metres[14] of industrial round wood a year.

The net annual increment of EU 25 forests is estimated at 645 million cubic metres[9]. In practice just 64% of the net annual increment is harvested, with growth exceeding harvest by such a large margin that, unless timber removals are increased, the region’s forests may suffer reduced vigour and greater susceptibility to insect, disease, storm and fire damage[14].





Forest types

70% of Europe's forest cover is 'semi-natural' (some human intervention, but generally natural characteristics), while only 8% is plantation forest[14], mainly to be found in countries like Denmark, Ireland, the Netherlands, Portugal and the United Kingdom. In addition, there are more than 8 million ha of forest, excluding the Russian Federation, untouched by man, which can be found in Sweden, Finland and Norway, as well as in Slovakia[12].

Species

Within climate constraints, forests are diversified by social needs and customs; Austria, Germany and Poland having a relatively high portion of coniferous forests, while mixed forests predominate in, for example, the Czech Republic.

Europe has a considerable area dominated by broadleaved (hardwood) species. It is not necessarily the case that hardwoods originate from (sub) tropical forests.

Nordic forests are mostly coniferous (softwood) due to the climate.

Ownership

Some 63% of the EU 25 forest is managed by 9,2 million family owners, with an average family forest holding of 13 ha, and 37% by 5,5 million public institutions[12].

Most public, and many private, forests in Europe are freely accessible, providing the opportunity to enjoy nature and natural products, like mushrooms, berries, honey and medicinal plants.

Functions

European forests fulfil many functions, from amelioration (improving the landscape and helping the local economy), to nature conservation, the preservation of biodiversity, recreation, CO_2 sequestration and commercial wood production.

Above left

The composition of EU 25 forests

MCPFE 2003

Above right

The ownership of EU 25 forests

MCPFE 2003

Below left

A coniferous plantation

Below right

A broadleaved forest

Above left

The public has access to 94% of European forest area

Above right

42% of Europe's forest cover is coniferous

Below

Data on EU 25 forests by country

FAO, State of the World's Forests, Rome, 2003

	Land area (x 1000 ha)	Forest area (x 1000 ha)	Forested land %	Population (1999) (x 1000)	Forest cover per capita (ha)	Volume (x M cubic metre)	Growing stock (cubic metre per ha)	Industrial roundwood production (x 1000 cubic metre)	Harvest roundwood (Average cubic metre per ha)	Carbon Stock in Wood Biomass (TgC)
Austria	8 273	3 886	46,97	8 177	0,48	1 110	286	10 416	2,7	580,36
Belgium/Luxembourg	3 282	728	22,18	10 579	0,07	159	218	4 202	5,8	47,80
Czech Republic	7 728	2 632	34,06	10 262	0,26	684	260	13 501	5,1	209,11
Denmark	4 243	455	10,72	5 282	0,09	56	123	2 768	6,1	26,80
Estonia	4 227	2 060	48,73	1 412	1,46	321	156	7 270	3,5	101,25
Finland	30 459	21 935	72,01	5 165	4,25	1 945	89	50 147	2,3	662,59
France	55 010	15 341	27,89	58 886	0,26	2 927	191	43 440	2,8	838,55
Germany	34 927	10 740	30,75	82 178	0,13	2 880	268	51 088	4,8	920,00
Greece	12 890	3 599	27,92	10 626	0,34	163	45	796	0,2	52,04
Hungary	9 234	1 840	19,93	10 076	0,18	320	174	3 305	1,8	132,13
Ireland	6 889	659	9,57	3 705	0,18	49	74	2 600	3,9	11,74
Italy	29 406	10 003	34,02	57 343	0,17	1 450	145	3 649	0,4	409,28
Latvia	6 205	2 923	47,11	2 389	1,22	509	174	12 624	4,3	177,60
Lithuania	6 258	1 994	31,86	3 682	0,54	366	184	4 050	2,0	0,51
Malta	32	0,32	1,00	386	0,00	0	0	0	0,0	0,06
Netherlands	3 392	375	11,06	15 735	0,02	60	160	879	2,3	29,29
Norway	30 683	8 868	28,90	4 442	2,00	785	89	7 478	0,8	265,61
Poland	30 442	9 047	29,72	38 740	0,23	1 930	213	24 489	2,7	550,03
Portugal	9 150	3 666	40,07	9 873	0,37	299	82	10 231	2,8	79,21
Slovakia	4 808	2 177	45,28	5 382	0,40	552	254	5 046	2,3	181,16
Slovenia	2 112	1 107	52,41	1 989	0,56	313	283	1 721	1,6	117,46
Spain	49 945	14 370	28,77	39 634	0,36	632	44	13 160	0,9	186,69
Sweden	41 162	27 134	65,92	8 892	3,05	2 914	107	58 920	2,2	1 077,00
Switzerland	3 955	1 199	30,32	7 344	0,16	404	337	7 612	6,3	140,14
United Kingdom	24 160	2 794	11,56	58 974	0,05	359	128	7 051	2,5	148,00
Total	418 872	149 532	35,70	461 153	0,32	21 187	142	346 443	Average 2,3	6 944,00

Europe’s forests are sustainable

Managed forests

Left entirely to nature, forests will achieve a climax stage, where the site is supporting the maximum amount of biomass soil fertility, rainfall and temperature conditions will allow. At this point the forest only grows as trees fall from 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.

With the coming into force of the Kyoto Protocol in 2005, the forest sector is about to receive credit for managing this specific environmental quality of the forest, while the development and trade of carbon emission credits enhances the significance of the forest sector within the global economy.

Increasing oil prices mean the forest sector not only provides alternative materials but also a sustainable source of (bio) energy. As present harvesting levels in the EU are well below sustainable limits, woody biomass energy has considerable potential to help sustain the future global economy.

Reforestation

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

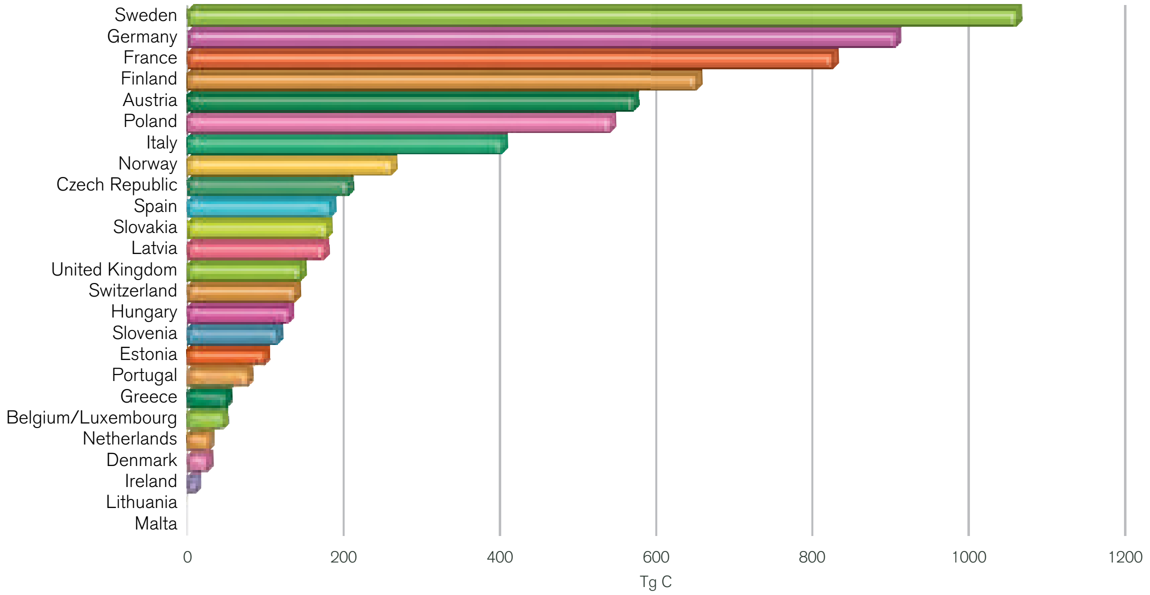
All European countries have policies and practices requiring reforestation. Although the number of trees planted per hectare will vary depending upon the species, site and management system, it will always be more than the number cut, in order to allow for natural losses and for the forest to be well stocked. Therefore there need 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 ever-increasing.

Below

Only 64% of the annual increment of Europe’s forests is harvested

Carbon stock in wood biomass in EU forests

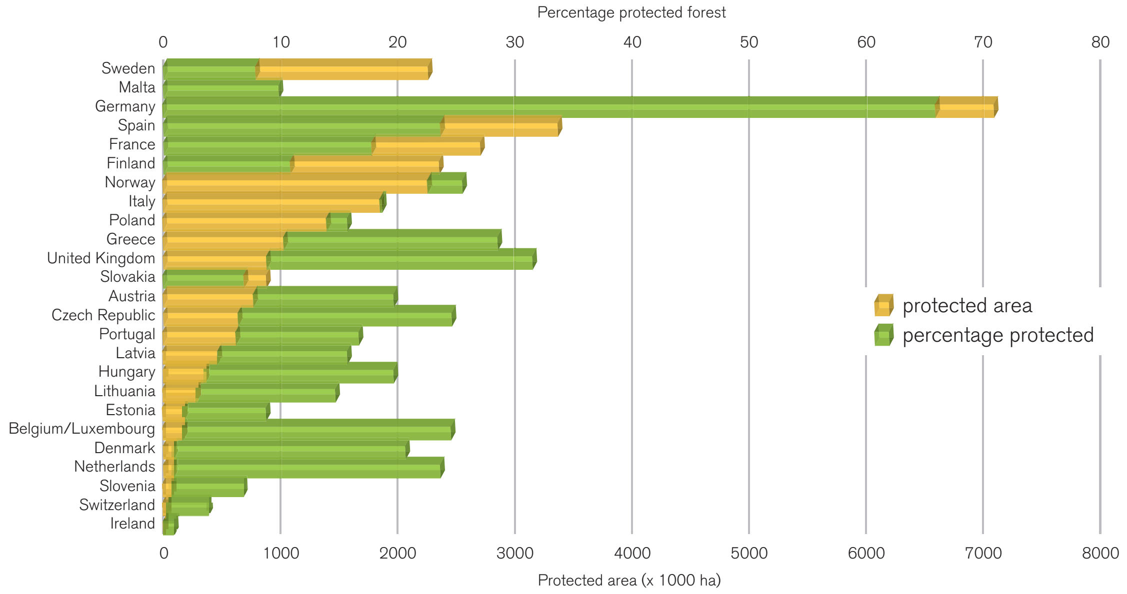


Forest vitality

Air pollutants, drought stress, acidification of forest soils, forest fires, damage by insects and game, and severe climatic events like storms, are major factors stressing European forest vitality. In 1999 nearly 10,8 million ha of forest or other wooded land were reported to be damaged[12]. Overall, storms and insects cause most damage, while forest fire is most damaging in the Mediterranean countries.

Good forest management, together with proper (inter)national legislation and enforcement, is the only way to improve and sustain healthy forest vitality.

EU 25 protected forest area



Opposite

66% of the European forest is restored by natural afforestation

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 forest management is moving towards methods that enhance natural processes and produce authentic forest structures which are environmentally appropriate, socially beneficial and economically viable.

Protected forests

Europe enjoys high levels of forest protection, with almost 12% of its forest area set aside to conserve ecological and landscape diversity[12].

More than 1,6 million ha are strict forest reserves[15], while there are large tracts of protected forests in Northern and Eastern Europe which are actively managed for biological biodiversity.

85-90% of the European forest serves multifunctional purposes and also helps to protect the soil, water, and other ecosystem functions like biodiversity, air quality, climate change and land stability.

Nature dominates forest regrowth

Although there are many different ways to rejuvenate the forest and approaches vary by country, 66% of the European forest is restored by natural regeneration.

This is important, as it contributes to the diversity and a healthy (genotype) rich species composition, structure and ecological dynamic. As this method is not always possible or appropriate from an economic or ecological perspective, natural regeneration is often complemented, or fully replaced, by planting.

30% of European forest regeneration occurs through planting or seeding and little more than 1% by coppicing[12].

Indigenous tree species

Many European forests have seen the introduction of non-indigenous species. For example, in the Netherlands, the fast growing species Larch, Douglas fir and American oak produce large volumes of quality timber.

With the increasing implementation of integrated forest management designed to respect natural ecosystems, these sometimes invasive species are being phased out in favour of indigenous species, at the expense of some reduction in the volume of quality logs.

European guidelines

After the Environmental Conference of Rio de Janeiro (1992), international and regional platforms defined internally accepted sustainable forest management guidelines. Currently the official body dealing with sustainability and protection of the European forest is the Ministerial Conference on Protection of Forests in Europe (MCPFE).

Certification

Europe leads the way

Since the early 1990s, forest certification has grown rapidly. By mid-2005, certified forests accounted for more than 246 million ha worldwide (or 36% of the world's 700 million ha of forest actively managed for wood and non-wood products).

Originally designed to halt tropical deforestation, it has developed most rapidly in Europe, due to high forest management standards and performance.

35% of the world's certified forests (almost 87 million ha) are in Europe and 92% of Europe's certified forests are in EU 25 countries, representing 80 million ha – more than half of all EU 25 forests.

As only a low proportion of wood is traded internationally (15-20% of the total logging volume – with the rest used domestically), certification and labelling alone cannot lead to sustainability in forest management. Effective government control and policy guidance on forest utilization is still imperative for sustaining resources[16].

More than 80% of the European forest is already under written management plans or guidelines contributing to sustainable management[12].

The debate on the use of certified wood and wood products in Europe has become focused on two schemes 'The Programme for the Endorsement of Forest Certification Schemes' (PEFC), originally developed to answer the needs of European forest owners, and the 'Forest Stewardship Council' (FSC), set up with the co-operation of WWF.

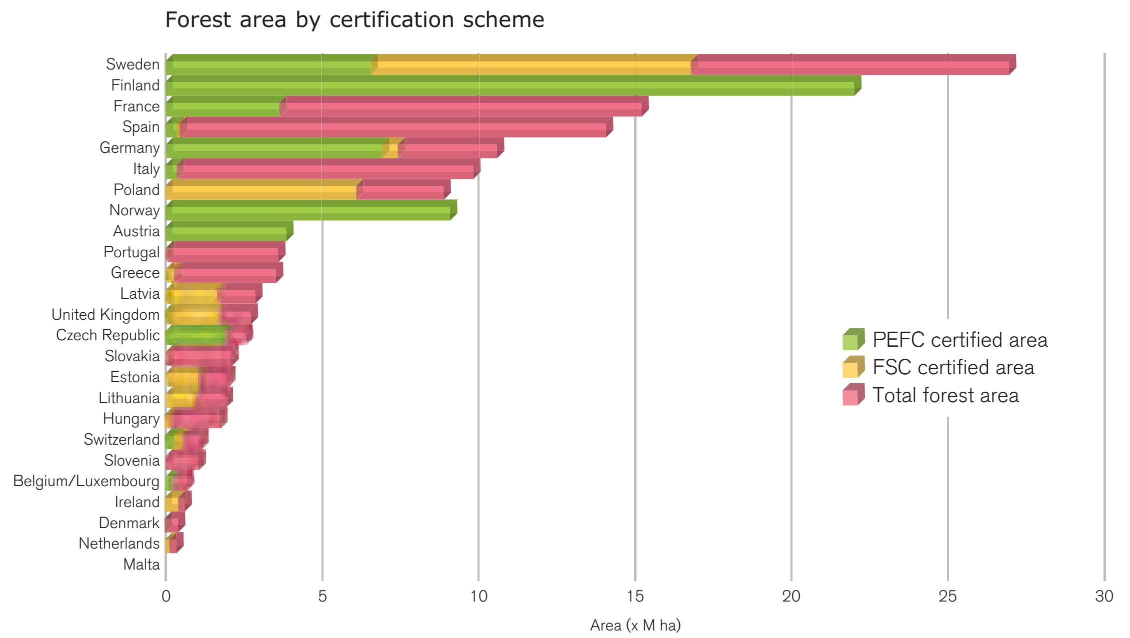
It is important to appreciate that over 90% of European wood consumption is sourced from European forests which are characterized as 'generally stable, well managed and in surplus production'. The consumer can therefore have a high degree of confidence in the environmental credentials of their product[13].

Opposite above

Forest area by certification scheme as at September 2005

Opposite below

Over 80% of European wood is used domestically



Forest Law and Enforcement, Governance and Trade (FLEGT)

The issue of illegal logging and of trade in illegally harvested wood has become the focus of attention both at a European and international level. The EC FLEGT action plan is a key element in this discussion.

The European forest and wood based industries strongly oppose illegal logging practices and trade in illegally sourced timber. Although the vast majority of industrial logging and trade in wood and wood products within the EU 25 countries is fully legal, the sector pro-actively supports effective and voluntary actions that will eliminate any nonconformity.

How wood products help slow Global Warming

- Tools are available to measure CO_2 impacts
- Wood and wood products save CO_2
- Wood buildings use less CO_2
- Governments are using legislation to curb CO_2
- Wood is going to become more important

Assessing the CO_2 impact of different materials

"Wood plays a major role in combating climate change… Trees reduce carbon dioxide in the atmosphere, as one cubic metre of wood absorbs one tonne of CO_2… Greater use of wood products will stimulate the expansion of Europe's forests and reduce greenhouse gas emissions by substituting for fossil fuel intensive products. The Commission is examining ways to encourage these trends."
European Commission's DG Enterprise, 2003

Forestry and wood products can help EU countries achieve their Kyoto targets, not only by increasing the carbon sink of wood-based products and growing forests, but also by decreasing carbon sources through substituting wood-based products for energy-intensive products and fossil fuels.

There are three broad areas to consider when assessing the relative CO_2 impact of different building materials: the energy used in the production of the material or product, the ability of the product to save energy during the use of the building, and the recycling and final disposal of the materials or products.

This is a complex process, in which governments across Europe are taking an increasing interest, and specific assessment tools are now available to designers, clients, specifiers and developers to help achieve sustainable strategies for housing and commercial buildings.

These tools enable designers to assess the initial CO_2 footprint of a building, as well as its environmental impact during use and disposal, and balance them against building and running costs.

Building Materials Carbon Indicator

The Nordic Timber Council and its partners are currently developing a tool to calculate the CO_2 footprint of elements of a particular building or structure that will be invaluable in choosing the best combination of materials and products.

Opposite above

The environmental impact of the wooden structure of Finland's METLA building is significantly smaller than that of an equivalent concrete structure, saving 620 t CO_2
Tarja Häkkinen and Leif Wirtanen, VTT Technical Research Centre of Finland, 2005

Opposite below

The timber framed Gallions Ecopark in the UK achieved an EcoHomes 'excellent' rating

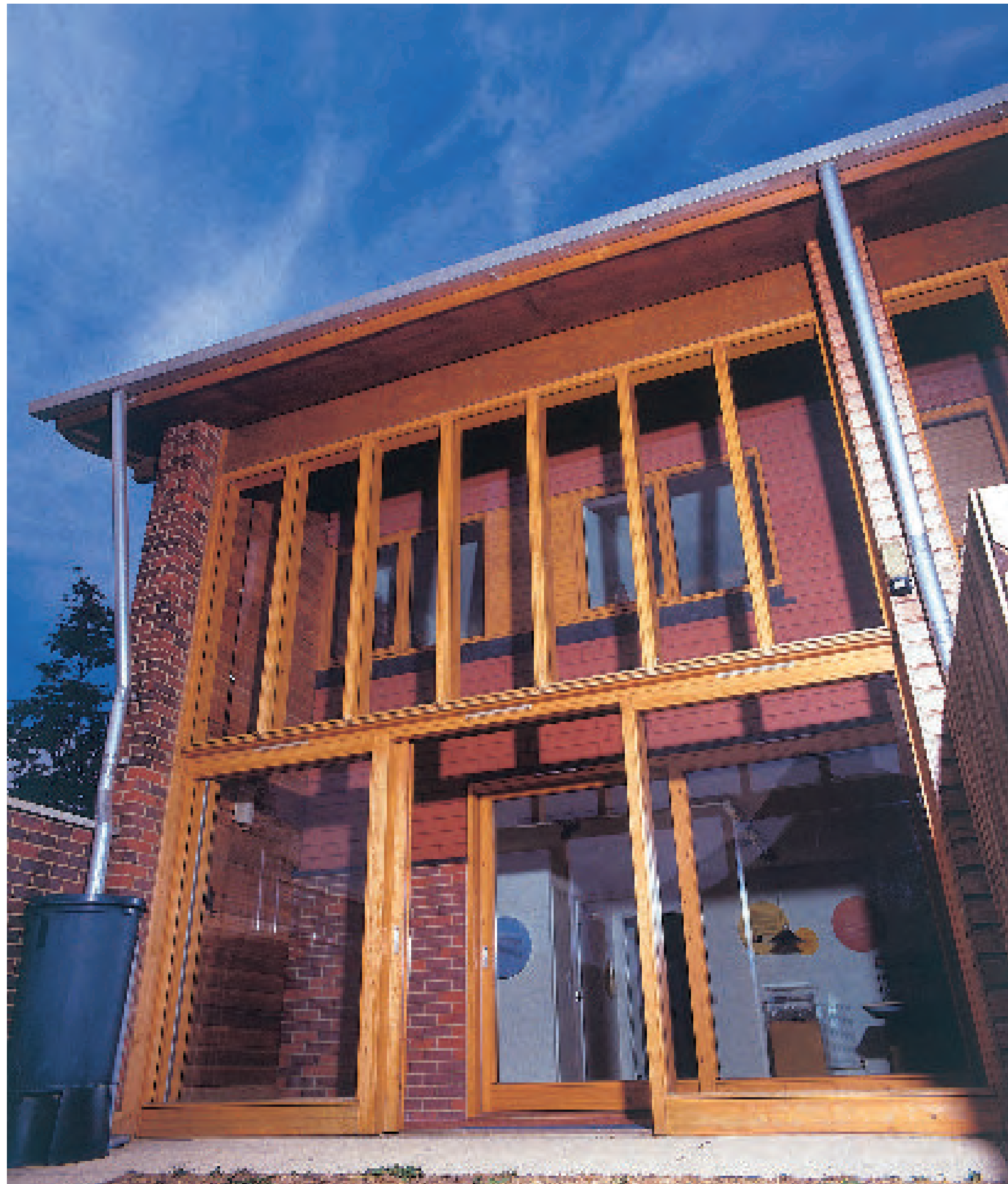
Life Cycle Assessment

LCA is a technique which assesses the environmental impacts of a building component right the way through 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 its use in a building, right through to its disposal or re-use/recycling[17].

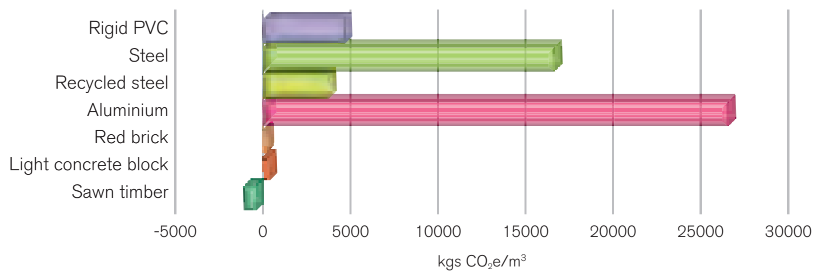
It considers the impact of a material or product's use during 3 specific phases:

Production phase	In-use phase	End-of-life phase
extraction	energy use	recycling
production	thermal properties	recovery
transport to site	maintenance	disposal

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



Net emissions of CO_2 including carbon sink effect



Above

A comparison of the CO_2 production of different materials (net CO_2 emissions including carbon sink effect)

RTS, Environmental Reporting for Building Materials, 1998-2001

Right

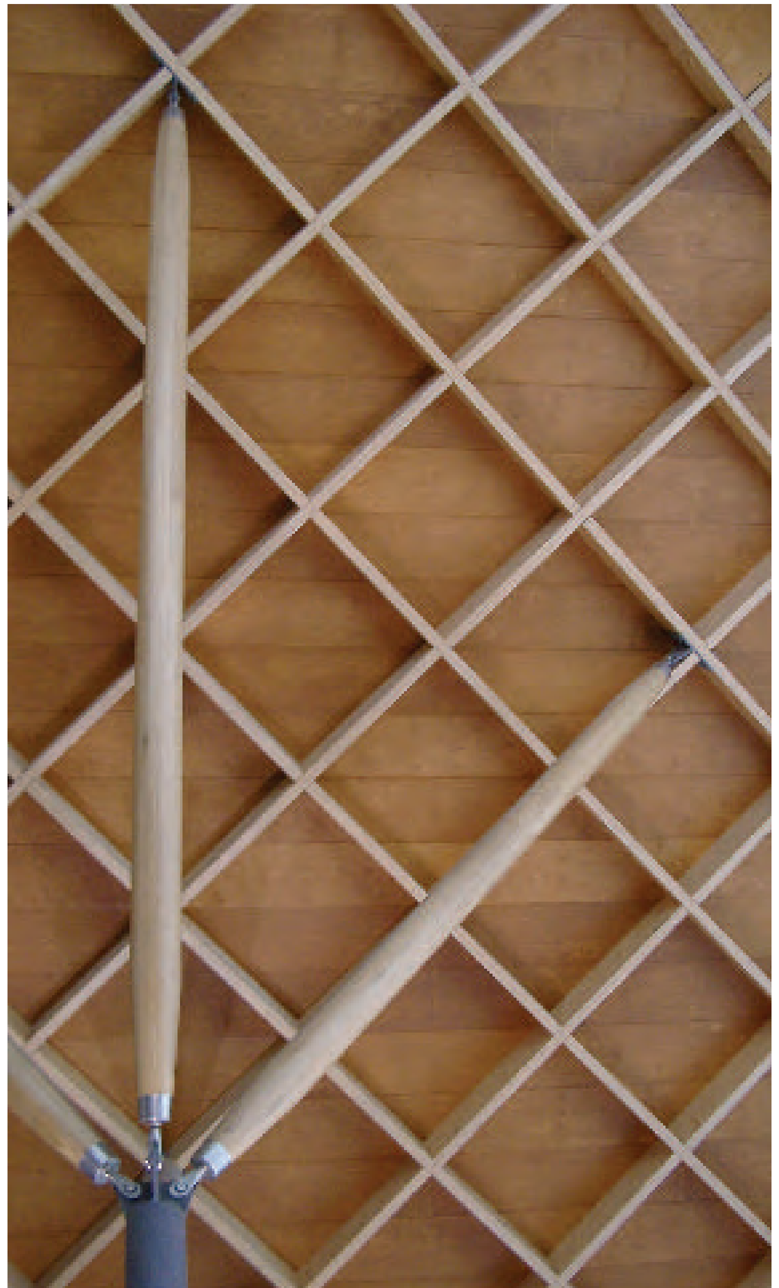
LVL struts and lamella roof, Hounslow East Station, UK

Production phase - energy use in extraction, production and transport to site

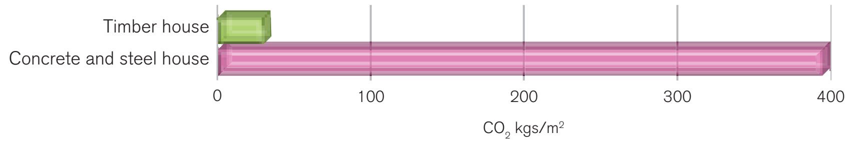
The energy used in the extraction and production of a material or product is called 'embodied energy'. Generally speaking, the higher the embodied energy, the higher the CO_2 emissions. Compared with the high emissions and embodied energy of alternative materials like steel, concrete, aluminium and plastic, wood has low embodied energy and, thanks to the carbon sink effect of the forest, negative CO_2 emissions[18].

Even when materials like steel or aluminium are recycled, the process often requires huge amounts of energy. By comparison, where the wood industry does require energy, it is one of the highest users of biomass power generation, often making a net contribution to national grid networks.

The impact of materials transport is taken account of within the LCA calculation.



CO_2 emissions from different house constructions



Above

The difference in CO_2 emissions from the materials and construction content of two houses is 370 kg/m^2

Tratek/SCA, Materials Production and Construction

Below

Energy use across the life-cycle of a house

Pohlmann, 2002

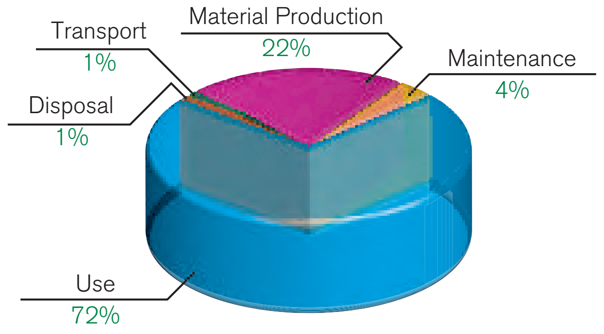
In-use phase

European governments are increasingly using legislation to improve the thermal efficiency and reduce the energy consumption of new buildings. This has an impact mainly on the building's overall envelope performance and is equal for all materials[19].

However, wood's natural thermal efficiency means timber systems can be more cost-effective in constructing energy-efficient buildings than cement block, brick or alternative materials. In addition, triple-glazed windows can be more easily produced in wood than in other materials and wood floors will provide better thermal insulation than concrete floors.

It is especially favoured in cold climates, where, with careful design and considered use of insulating materials, low-energy consumption reduces heating costs whilst providing comfortable living conditions, often in sub-zero external temperatures.

Energy use across the lifecycle of a house



A Swedish study undertaken in 2001 compared the embodied energy and CO_2 emissions from the construction of two similar houses, one made from timber, the other from steel and concrete. The difference of 2 300 MJ/m^2 energy used in the materials and construction of the houses is enough to heat one of the houses for 6 years, while the 370 kg/m^2 difference in CO_2 emissions is equivalent to the emissions from 27 years' heating – or driving 130 000 km in a Volvo S80.

"Two thirds of energy used in European buildings is accounted for by households; their consumption is growing every year, as rising living standards are reflected in greater use of air conditioning and heating systems."

EU Commission: Better Buildings: New European Legislation to Save Energy, 2003

School in the UK, case study
Kingsmead Primary School in Cheshire, UK, has become an exemplar project, short-listed for the Prime Minister's Award for Better Public Buildings.

Natural ventilation and daylighting, timber construction with high levels of insulation, the use of photovoltaic cells and a wood burning Combined Heat and Power boiler, all contribute to reduced energy and running costs.

The money saved on running costs each year pays for an extra teacher.

End-of-life phase
Wood and wood-based products have unique end-of-life properties. In addition to recycling by-products like sawdust, chips and off-cuts into particleboard, many other panel products are manufactured from recycled wood. However, beyond this, wood is increasingly used as a substitute for fossil fuels, providing a renewable energy source which simply returns to the atmosphere the CO_2 it originally removed.

Opposite left

Kingsmead Primary School, Cheshire, UK. Designers: White Design

Opposite right

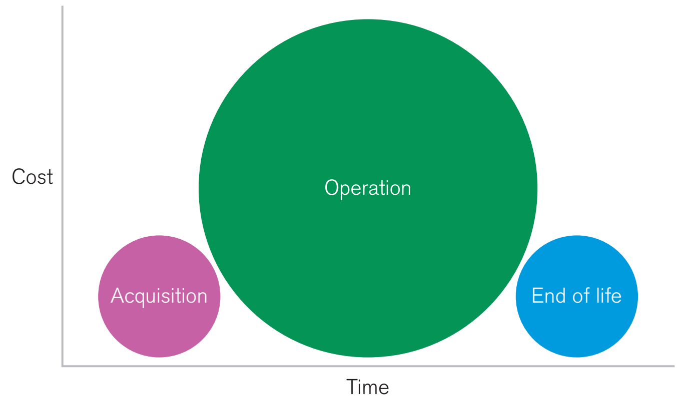
Recycled wood can be made into many panel products

Above

Operating costs are significantly larger than acquisition and end of life costs

Right

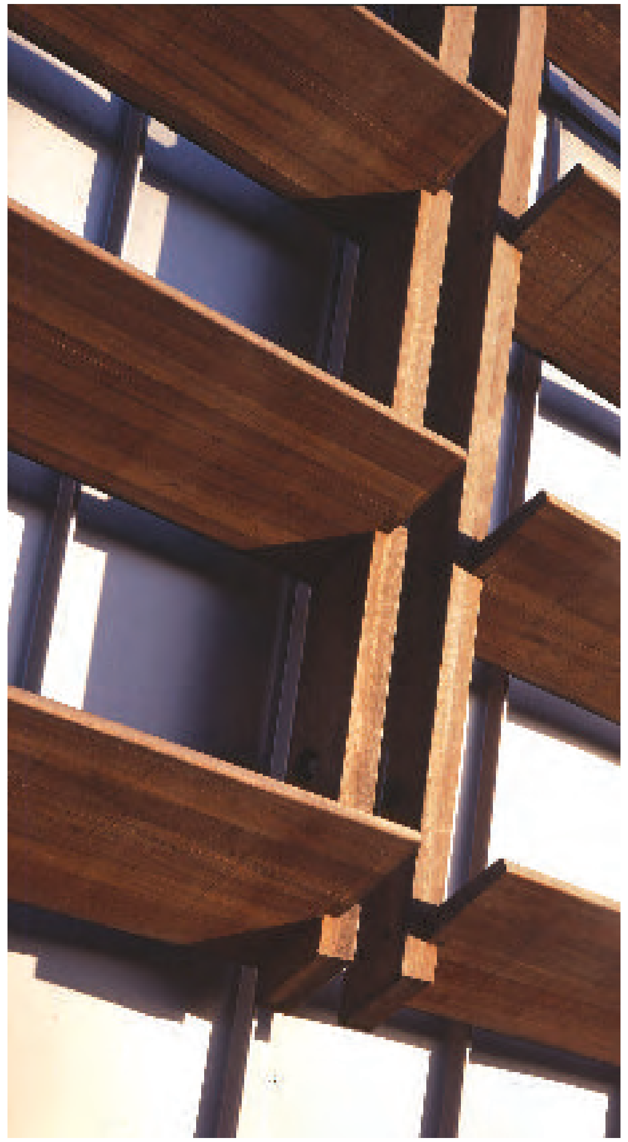
Laminated wooden brise-soleils reduce solar gain and air conditioning costs



Whole Life Costing

Developments will increasingly need to ensure a balance between environmental impact and long-term value for money. WLC is a commonly used technique which enables comparative cost assessments for a product or project to be made over a specified period of time, taking into account all relevant economic factors of initial capital costs and future operational costs - the total cost of a building or its parts throughout its life, including the cost of planning, design, acquisition, operations, maintenance and disposal, less any residual value. Together with LCA, it can provide a thorough economic and environmental assessment to support decision-making and an effective procurement strategy.

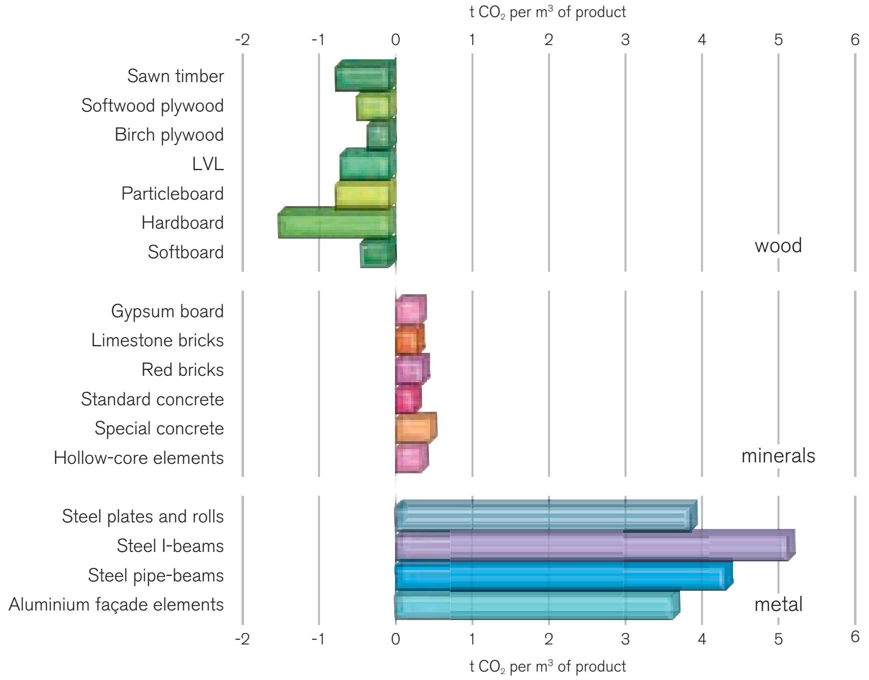
What may appear to be a low-cost choice initially may prove more expensive during its service life or when it comes to disposal. For example, in 2003, a consultancy working with the London Borough of Camden in the UK conducted research on window costs, which found that more expensive high-performance timber windows had a 14% lower Whole Life Cost than PVC windows when comparing identical specifications[20].



How much CO_2 can be saved using wood?

The energy used in construction, including manufacturing, transporting and erecting buildings, is significantly lower for wood-based products and systems than for other building materials.

Net CO_2 lifecycle emissions



"Specifying wood in public procurement can help fulfil national and local climate change programmes. Encouraging the use of wood products can act as a greener alternative to more fossil-fuel intensive materials. Substituting a cubic metre of wood for other construction materials (concrete, blocks or bricks) results in the significant average of 0,75 to 1 t CO_2 savings."

International Institute for Environment and Development, Using Wood Products to Mitigate Climate Change, 2004

"The combined effect of carbon storage and substitution means that 1m³ of wood stores 0,9 t CO_2 and substitutes 1,1 t CO_2 - a total of 2,0 t CO_2."

Dr A Frühwald

Left

Net CO_2 emissions of selected building materials during the whole lifecycle

Building Information Foundation, RTS

Opposite

The timber construction of London's Fairmule House saved around 1 000 t CO_2

"The decision to include forest sinks at the 2001 Conference of the Parties to the UN framework Convention on Climate Change, opens the way for the possible inclusion of wood products as of 2013-2017 (second commitment period of the Kyoto Protocol).
Since wood products store the carbon initially trapped in trees, carbon is removed from the atmosphere as long as the wood product remains in use and beyond, when the product is re-used, or recycled for secondary material or energy recovery. Besides, the more wood products replace other materials, the more the so-called 'substitution effect' further reduces CO_2 in the atmosphere. CO_2 reductions achieved by wood products are eligible under Art. 3.4 of the Kyoto Protocol and the woodworking industries may be granted carbon credits in the framework of the emissions trading scheme, at EU and international level, if and when decisions and procedures are put in place."

DG Enterprise - Unit 4, COMPREHENSIVE REPORT 2002 – 2003 regarding the role of forest products for climate change mitigation[6]

Case study
London's Fairmule House is the UK's biggest solid timber construction. 5 storeys high, it was fabricated offsite using laminated panels up to 12,5m long, 2,9m wide and 170mm thick, which were produced from sawmill offcuts.

The glue content of the panels is 2% and the building uses 360m³ of timber, which in turn sequestered 300 t CO_2 from the atmosphere.

If concrete or steel had been used instead of wood, there would have been around 720 t CO_2 emissions.

The main opportunities for substituting wood products

Carbon storage in domestic products

Unit	Carbon Content
House	10-25 t C/house
Wooden window	25 kg C/window
Wooden flooring	5 kg C/m²
Furniture	1 t C/household
House and contents	12-30 t C

The main opportunities to capitalize on these CO_2 savings include using a greater proportion of wood products, using wood products with a longer life, and substituting wood and wood-based products for energy-intensive materials.

An idea of the scale of the opportunity is provided by a research study conducted by Dr A Frühwald, of Hamburg University, which estimated that between 12 and 30 tonnes of carbon can be stored in the fabric and content of an average timber house.

Left

Carbon storage in domestic wood products

Frühwald, 2002

Below

12 - 30 t C can be stored in the fabric and content of an average timber house

Opposite above

Wooden beams save CO_2

Opposite middle

The environmental impact of window frames and (right) of flooring made from different materials

(Global Warming Potential, Acidification Potential, Eutrophication Potential, Photochemical Ozone Production Potential)
FAO, 2003

Opposite below right

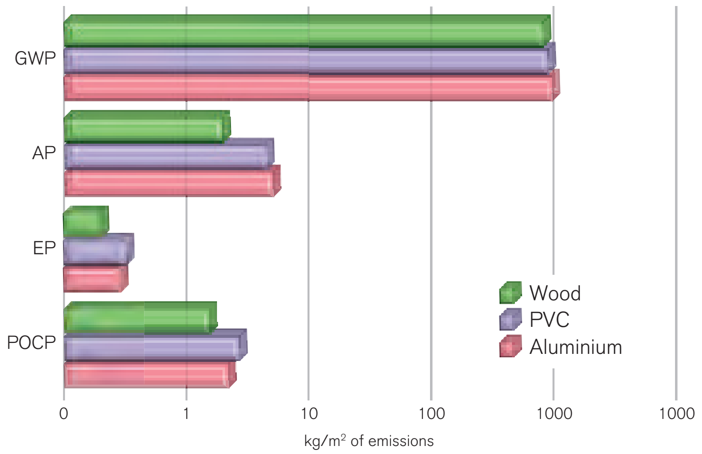
Comparison of CO_2 emissions of beams made of different materials

Indufor, CEI-Bois Roadmap 2010, 2004

Wood windows

In the production phase, wood windows have lower environmental impacts than PVC-U and aluminium. But, not only do they use less energy to produce, they also use less energy throughout their life, thanks to wood's excellent insulation and cold-bridging properties.

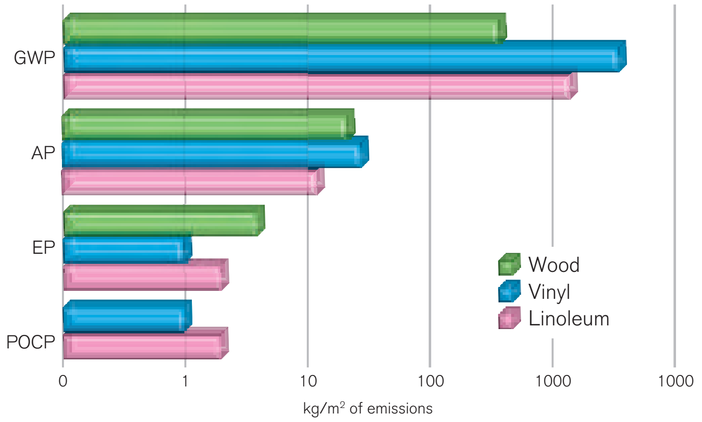
Window frames: the environmental impact



Wood floors

Low-energy and thermally efficient, wood floors are healthy, durable, and have low environmental impacts.

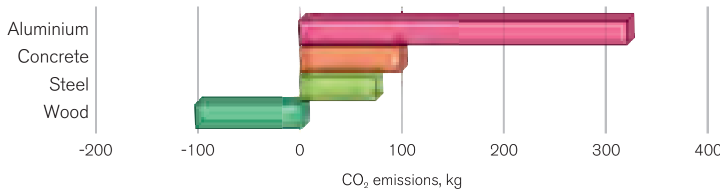
Flooring: the environmental impact



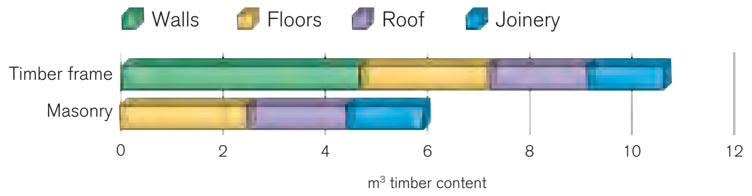
Wood beams

A French study comparing wooden building beams against concrete, steel and aluminium, clearly illustrates the gap between CO_2 neutral (absorbing) wood and its CO_2 producing alternatives.

Beams: CO_2 production



The timber content of wood vs masonry houses



Timber frame share

North America	90%
Scotland	70%
Scandinavia	45%
Japan	45%
Europe	8-10%

Timber frame

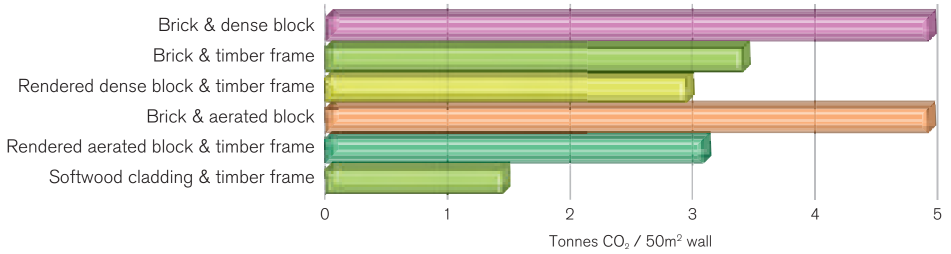
There are significant CO_2 savings to be made by using timber in the construction of housing and other buildings, both in terms of embodied energy and in-use energy efficiency. There are also many different timber frame and solid timber construction systems commonly used across Europe. Generally, the higher the timber content, the lower the embodied energy of the building.

For example, in the UK a brick-faced timber frame house will save 1,55 t CO_2 per 50m² wall, compared with brick and block, while facing the timber frame with softwood weather-boarding will result in savings of up to 3,45 t CO_2[21].

This means that a typical UK timber frame house could save around 5 t CO_2 (about the amount used driving 23 000 km in a 1,4l car) even before its lower running costs are considered.

Wood's naturally good thermal insulation makes it the material of choice in cold climates. But wood framed buildings are just as efficient in hot climates, making use of wood's natural ability to dissipate at night the heat built up during the day. Often, a combination of a thermally-efficient lightweight wood frame with a high thermal mass concrete or stone core is used to achieve the most effective insulation along with minimal daytime/night-time temperature fluctuation.

CO_2 emissions for different wall constructions



Above left

Timber frame is the most popular house construction method in the developed world
Frühwald, 2002

Above

A comparison between the timber content of a 100m² two-storey detached house using 140mm studs timber frame and masonry
TRADA and Lloyd's Timber Frame, UK

Below

A comparison of CO_2 emissions over the lifecycle of different wall constructions, based on a 60 year life
BRE Environmental Profiles database

Right

A typical timber frame housing development in the UK

Middle

Preliminary environmental results for typical residential dwellings in wood and steel
Athena Institute, Forintek, Canada

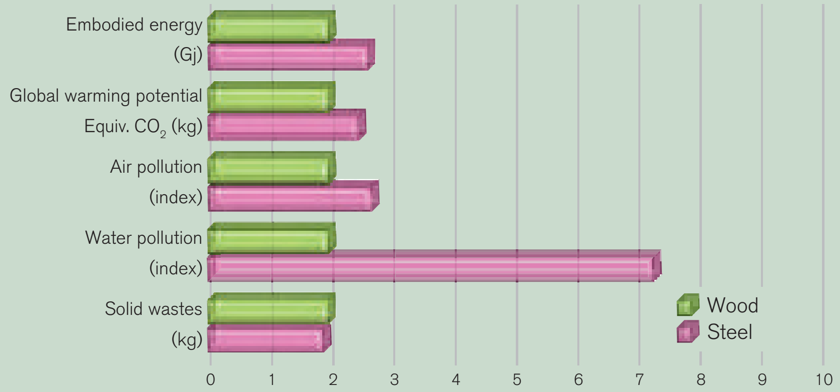
Below

Preliminary environmental results for typical residential dwellings in wood and concrete
Athena Institute, Forintek, Canada

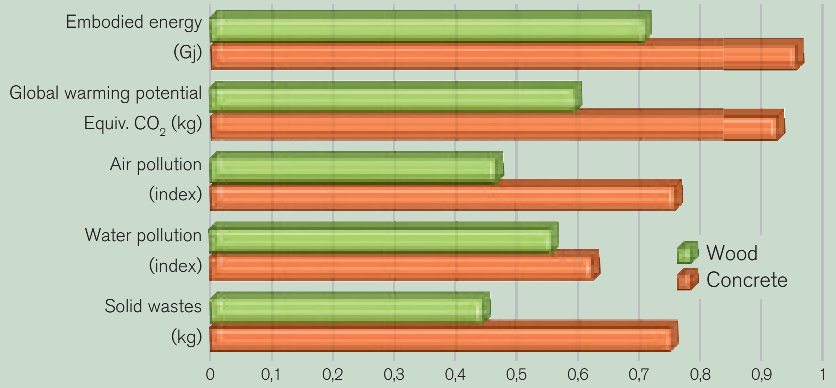
Roofing

A typical German roof contains between 4,6 and 10,5 m³ seasoned timber, keeping between 3,7 and 8,4 t CO_2 from the atmosphere[22].

Environmental impacts of wood house vs steel house



Environmental impacts of wood house vs concrete house



Case study

LCA methods were used to investigate the impact of different building materials on whole buildings, testing different materials in different climate conditions in similar single storey family homes in Minnesota and Atlanta USA; timber versus steel in Minnesota, and timber versus concrete in Atlanta. Results show considerable savings for wood construction in place of steel or concrete in embodied energy, Global Warming Potential, CO_2 and other environmental impacts.

European legislation

“Forestry practices can make a significant contribution by reducing greenhouse gas emissions through increasing the amount of carbon removed from the atmosphere by the national forest estate, by burning wood for fuel, and by using wood as a substitute for energy-intensive materials such as concrete and steel.”

Securing the Future – delivering UK sustainable development strategy

Opposite

The 2002 European Performance of Building Directive (EPBD) will apply to almost all buildings, residential and non-residential, both new and existing, while Eurocodes play a major role in creating a single market for wood building, forming a basis for specifying contracts in construction works and related engineering services, as well as a framework for drawing up harmonised technical specifications for construction products.

Many countries across Europe have set targets to reduce CO_2 emissions within the Kyoto Protocol and, encouraged by EU policies, are adopting legislative methods to ensure buildings and materials help achieve individual country targets.

In many cases, this legislation has led to an increased use of wood, or at the very least, consideration of wood as an alternative to conventional construction material, such as steel and concrete. France, for example, is preparing a specific decree to ‘define the conditions for using a minimum rate of wood material in public buildings’, in the framework of its law on air and rational energy use.

Building regulations

Changes in national building regulations are encouraging multi-storey wood buildings. Denmark and Finland now allow up to four storeys and Switzerland six. Sweden has no set limit on the number of floors and six storey wood buildings are common, while the largest timber frame building in the UK is now seven storeys high.

In the UK, for example, where 50% of the country’s CO_2 emissions are attributable to the energy consumed by and in buildings, new building regulations were introduced in 2001 to require all new buildings to achieve target U-values so as to reduce the amount of heat energy loss through the fabric of the building and its components, such as windows, doors and roof. Targets will be made 20% tougher in revised regulations to be introduced in 2006[23].

The challenge

The evidence is clear, but current policies still have some way to go to recognize the full benefits to the climate of using more wood.

“In spite of the overwhelming evidence to the contrary, the use of wood substitutes, and the belief that these substitutes are better for the environment than wood, are both increasing.
Greenhouse Gas emissions reporting under the United Nations Framework Convention on Climate Change unjustifiably favours non-wood alternatives by classifying harvested forest products as emissions as soon as they leave the forest site.
Building and packaging standards also place barriers in the way of wood use, often despite technological advances which might overcome structural or hygiene concerns.
Recycling and recovery programmes for wood are often dismissed in favour of incineration and landfill, due to prevailing attitudes and lack of political will.
Each of these policies has the perverse effect of favouring more carbon intensive wood substitutes.
The development of a workable carbon intensity labelling system, pro-wood building and packaging standards and invigorated recycling programmes would help to maximise the climatic advantages of wood use.”

IIED, Could wood combat climate change? 2004

The eco-cycle of wood and wood-based products

Wood is renewable

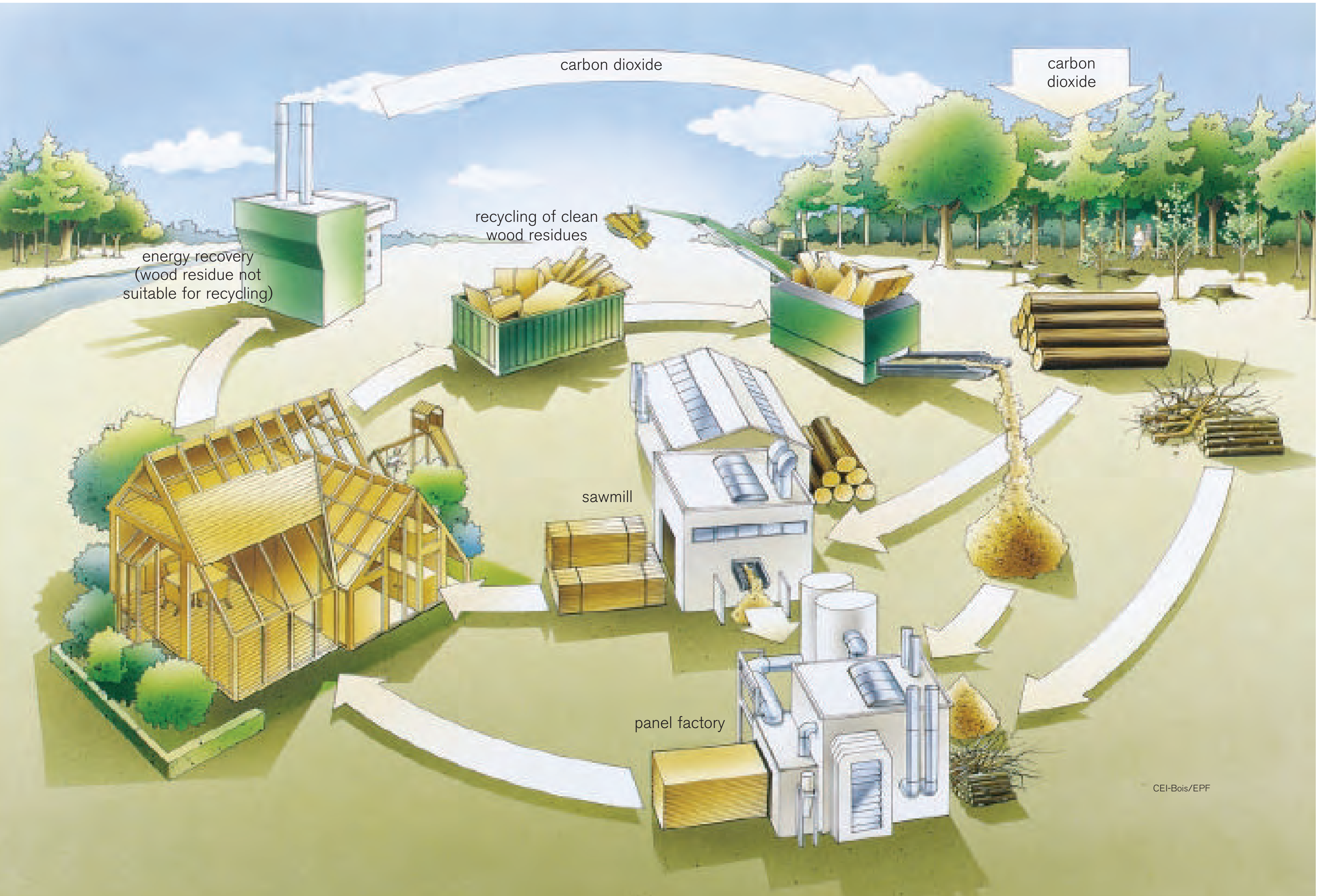
Wood and wood-based products can have a long life

They can often be re-used

They can be recycled

They can be used as biomass energy to substitute for fossil fuels

The carbon cycle of wood-based products



Opposite

The carbon cycle of wood and wood-based products
CEI-Bois, EPF

Top

Wood flows in Europe
Dr A Frühwald, 2004

Wood is a renewable and versatile raw material. It can be used for construction, furnishing, furniture, food handling, packaging, pallets and transport applications. At the end of its first life, wood or a wood-based product can be:

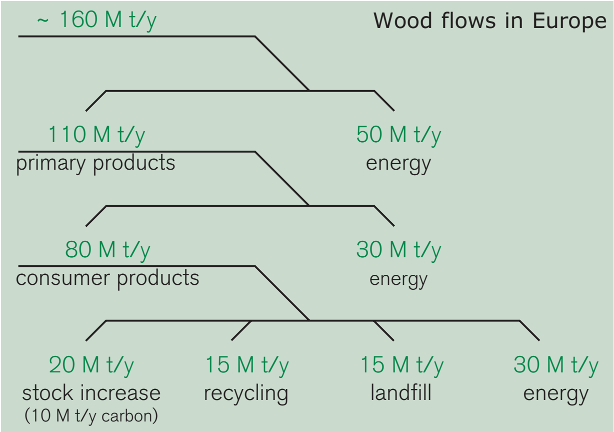
- Re-used
- Re-cycled
- Used as a carbon-neutral source of energy.

Respect for the carbon cycle calls for respecting this sequence of wood use, so as to get the greatest benefits not only from a longer period of carbon storage, but also from the energy and finite resources saved from the production of alternative fossil-based materials.

Wood produces minimal waste

Very little, if any, waste is generated during the manufacturing of timber and wood-based products, as almost all by-products are used, whether as a raw material, or as an energy source.

During the production of sawn timber, the off-cuts, wood chips and sawdust generated are used on site to produce heat and energy for the drying kilns and other operations, and off site for the production of particleboard or for the pulp and paper industry. There is also growing interest in this source of energy to fuel biomass power plants.



Recycling is gaining impetus

Europe's annual wood consumption is estimated at 160 million tonnes (geographical Europe, excluding the CIS). Of this, 15 million tonnes is recycled every year, an amount which is expected to rise significantly, as legislation will soon prohibit using landfill for waste wood.

Further impetus for recycling wood will come from the expected European legislation on packaging waste, which will require that 15% of all wood packaging be recycled. So, even in Nordic countries, where wood raw material is abundant, a new stream of recovered wood will become available for recycling.

In recent years a number of internet-based services has been launched to support this growing trade, not just offering trading services, but complete logistic services like door-to-door transport, administrative handling, grading, sampling and analysis.

All these developments stimulate the sustainable use of wood resources and will continue to improve the environmental efficiency of its use.

Wood re-use

Reclaimed wood is often highly valued

The average lifetime of wood in buildings depends on regional practices and local circumstances, like climate conditions. After many decades or even centuries of use, wooden beams can be re-used, either intact or re-sized, in new buildings, substituting for new wood or less environmentally-friendly materials.

The same is true of wooden panelling, flooring and furniture parts, which are prized in many countries for their character and patina. Some specialist companies even collect used wood in order to manufacture instruments like violins, pianos and flutes, so that they will have the same sound quality as historical pieces.

Cities are taking the initiative

One example of good practice is the city of Vienna, which has made an inventory of its urban wood resource and is actively involving industry, architects and builders in developing a strategy to optimize the life-cycle of wooden building materials and extend re-use and recycling in order to minimize greenhouse gas emissions.

A recent study demonstrated that, of 44 000 t of building and demolition wood, over half could be re-used, 6 700 t as sawn timber and 16 000 t recycled into wood-based panels[24].

Below

Kappellbrücke, Lucerne, Switzerland which has stood since the 14th century

Photograph by Will Pryce from the book 'Architecture in Wood' © Thames and Hudson Ltd, London

Opposite left

Primary use of hardwood: poles in a marine application

EDM

Opposite right

Second use: shingles for outdoors cladding or roofing

EDM

Opposite below

Wooden pallets can be repaired and re-used

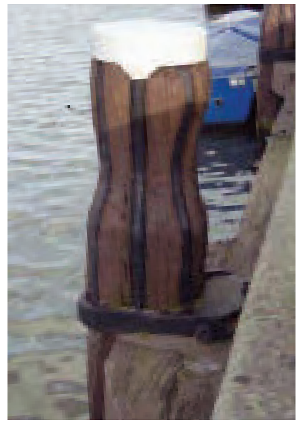
Re-using long-life products

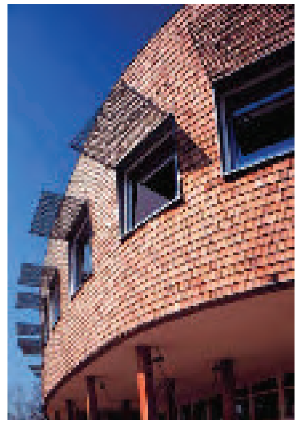
Hardwoods and treated timber from demolition sites are particularly valued because of their weather resistance and can be transformed into shingles, garden sheds, decking or fencing. The potential for re-using treated wood depends on the type of treatment used and on local legislation.

Re-using pallets and packaging

Wooden crates and pallets can also be re-used, with or without repair, which might be carried out by re-using parts of other damaged pallets, or by using new timber made from virgin wood, blockboard or pressed wood chips. Sometimes wood preservative or, increasingly, thermal treatments, are used to enhance the life span of pallets and to meet legal requirements.

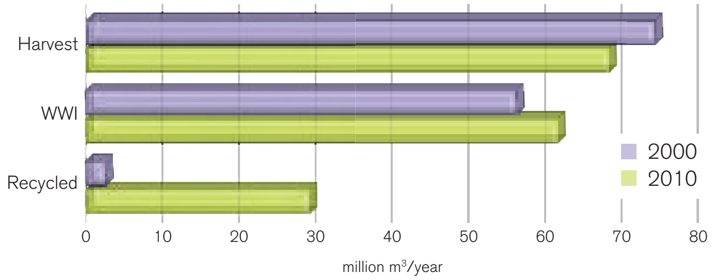
Re-used pallets and packaging materials are beginning to be used to make garden sheds and other garden applications, while more and more furniture manufacturers are taking potential recycling into account at the design stage.



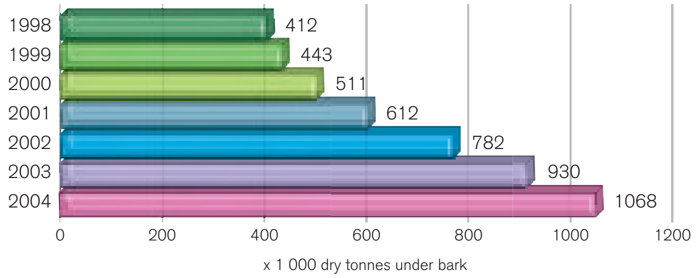


Wood recycling

Projected EU 15 wood residue flows



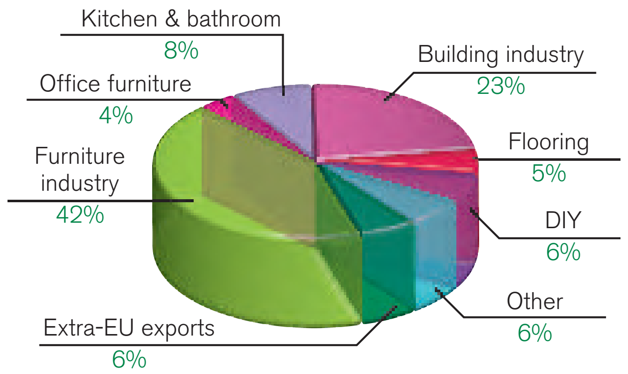
The growth of the recovered wood market in Spain



Wood-based panels

The forest-based industries consider recycling to be an integral part of producing sustainable products and are constantly looking for ways to increase the recycled content of manufactured products. For instance, the proportion of sawmill by-products used in the production of particleboard has risen from 1/3 in 1970 to over 75% today[25].

Particleboard user industries in Europe, 2004

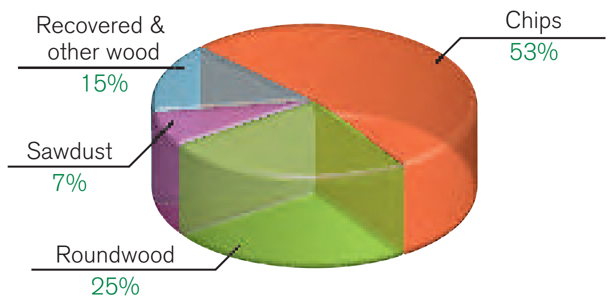


The relative amounts of raw material used depend largely on the local availability of wood resources, but nowadays an increasing amount of post-consumer wood is recycled into wood-based panels. Some companies in Southern Europe even use up to 100% of sawmill by-products and recovered wood because of the scarcity of virgin wood.

The production of wood-based panels, including particleboard, is expected to continue to grow during the coming decades, as is the use of recovered wood. The bar charts show the growth in recovered wood seen in just one country, Spain, as well as projections for Europe as a whole.

Quality standards, placing limits on the permissable amount of impurities, are set by the European Panel Federation, with the aim of ensuring wood-based panels are safe and environmentally friendly, regardless of whether they are produced from recycled or virgin wood material. 'EPF industry standards' are based on the European standard for the safety of toys, intended to be sucked by children[26].

Raw wood mix in particleboard, 2004

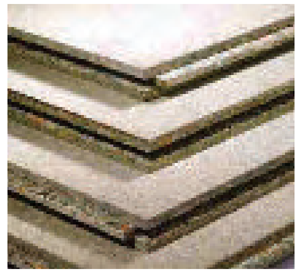


New developments

A great deal of work is currently underway across Europe to develop new markets and new products for recovered wood, including:

- Wood-plastic composites
- Animal bedding (pet baskets, horse stables and riding tracks)
- Surfacing as mulch, pathways, playground surfaces etc.
- Filling material for compost
- Charcoal production.

Only high quality recovered wood can be used in these applications, in order to safeguard the health of all 'consumers' involved.



Opposite above

Particleboard user industries in Europe 2004

EPF Annual Report 2004/5

Opposite centre

The use of recycled wood is expected to grow much faster than the overall use of wood within the Wood Working Industries and faster than the growth in harvest

Indufor/UNECE-FAO

Opposite below

Spain, for example, is using ever-increasing amounts of recovered wood

ANFTA (Spain)

Above left

The relative importance of different ingredients in the raw wood mix used for particle board manufacture. % dry tonnes within selected countries

EPF Annual Report 2004/5

Above right

Particleboard

Centre right

Coppiced or recovered wood can be used to make charcoal

Below

Recovered wood can be used for surfacing

Wood and energy recovery

Wood energy is CO_2 - neutral

Using wood manufacturing by-products and end-of-life wood products as a source of energy is the final link in the virtuous wood cycle. Instead of its energy being wasted in landfill, it provides a carbon neutral substitute for fossil fuels. Since it only returns to the atmosphere the CO_2 that has been taken from it by the growing trees, wood combustion does not contribute to global warming or the greenhouse effect.

Wood energy is clean

Since it contains little of the sulphur or nitrogen which contribute to acid rain, and furthermore produces little ash, wood energy is clean. It reduces landfill and waste disposal costs, and any impurities from the combustion gases can be eliminated before they are released to the stack by the powerful gas cleaning systems increasingly designed in to larger power plants.

There are many sources of wood energy

Wood energy can be derived from many different sources: from forestry chips, bark, sawmill and shaving residues, to furniture manufacturing by-products and wood recovered from consumer products after use. In addition, forest residues, generated during harvesting or thinning operations are increasingly being used as a biomass energy source, not only for household heating, as was common in the past, but also for industrial heat and power generation.

In a modern CHP (Combined Heat and Power) power station, wood by-products generated during the production of $1 m^3$ sawn timber could be transformed into 250-290 kWh electricity and 2 800-3 200 MJ thermal energy - more than the energy needed for the production of seasoned sawn timber[27].

As noted earlier, the wood industries themselves are major users of wood-derived biomass energy, which currently accounts for up to 75% of the energy the industry uses for drying timber and processing panels. Traditionally this energy was generated by using wood fractions which were unsuitable for the manufacturing of end products. However, the subsidies received by power plants combusting wood biomass energy can create unfair competition between wood biomass used as a raw material and as an energy source.

Opposite

Thinnings can be used as biomass energy, this example is from Surrey, UK

The balance between energy and product use

The European Woodworking Industries, together with the Pulp and Paper Industries and the European Commission, initiated a Working Group in 2003 to come up with a set of recommendations to achieve a balanced use of wood for both energy and product use, summarized as follows:

In order to ensure the sustainable development of wood and its related industries, to safeguard the competitiveness of Europe's wood-based sector and the jobs of its employees, as well as our climate policy commitments, the wood-based industries urge all decision makers in the European Union and in the member states to:

- Acknowledge that the European wood-based industries are a key partner in optimizing Sustainable Forest Management and in maximizing added value and employment from forest resources

- Avoid financial support systems for 'green' electricity that give inappropriate incentives to an unbalanced use of biomass for electricity production only

- Support better mobilization of wood and other biomass, specifically by supporting forest owners' initiatives aimed at improving market access (associations, co-operatives, critical mass supply, etc.), giving them a stronger incentive to practice forest management

- Develop coherent strategies to secure and expand the availability of wood as a raw material, as well as an energy source, taking into account the need to establish a level playing field for all users along free-market principles

- Implement programmes to exploit the large potential of still unused biomass in an economic and sustainable way

- Support activities regarding efficient recovery of forest residues and development of biomass sources specifically grown for energy production

- Foster the recycling of wood by-products and residues by supporting research on collecting, sorting and cleaning technologies and to improve waste regulations (wood residues that comply with quality standards are not waste)

- Formulate a comprehensive definition of wood and non-wood biomass, including secondary wood products and fuels

- Support the establishment of efficient logistic systems for the transport and distribution of biomass

- Favour projects which minimize the distances between biomass harvesting and by-product supply and the site of utilization, leading to lower economic and environmental burdens for transport

- Encourage efficient generation and use of renewable energies, by establishing rules and administrative procedures to guarantee that power plants using biomass are based on combined heat and power technology, utilizing a high share of their fuel input, including their heat production

- Step up R&D in energy technology for biomass utilization, e.g. to further improve the energy efficiency and production of CHP installations, transport logistics, storage conditions, storage positioning systems and new data transmission technologies

- Establish information exchange on R&D results and enhance networking concerning best practice solutions, especially concerning the optimization and integration of the use of wood as a raw material and an energy source within the whole value chain

- Consider wood-based products as carbon sinks under the Kyoto Protocol, thereby acknowledging the contribution of wood-based products to climate change mitigation and the carbon cycle, and recognize their superior eco-efficiency versus other materials, as well as their outstanding properties in recycling with minimal energy use.

Opposite

Local area CHP boiler fed by wood waste from council tree prunings

Above

Wood residues suitable for panel production or biomass energy production

The benefits of using wood

- Structural expression
- Natural beauty
- Easy to work with
- Good insulation
- Healthy
- Safe, light, strong and durable
- Wide range of engineered solutions

Building with wood

Today, when architects and engineers design landmark buildings like bridges or government offices, schools or factories, they look to timber to express a contemporary beauty which is nonetheless rooted in nature and a respect for the environment.

Wood is increasingly used in housing, nurseries and schools, religious, administrative, cultural and exhibition buildings, and halls and factories, as well as in transport-related construction like bridges, sound barriers, hydraulic engineering and avalanche control.

The flexibility of lightweight modular timber construction is particularly suited to multi-purpose halls because of its ready adaptability.

Wood is a high-performance material, low in weight, yet high in density, with excellent load-bearing and thermal properties, and the availability of a wide range of timbers, each with its own characteristics, means wood can be suitable for most special requirements.

Timber construction is typically characterized by a multi-layered combination of different materials which work together as a system to provide optimum stability, thermal, acoustic and moisture insulation, fire safety and constructional wood preservation.

"Timber building is part of future energy-efficient building. Wood is sustainable, CO_2 neutral and a highly effective insulator, creating excellent living conditions. One specific advantage of wood is its ability to reduce energy use. Timber construction has a higher heat insulation value than conventional construction methods, even with lower wall thicknesses. An external wall constructed using timber may have only half the thickness of a brick or concrete wall, yet provide double the thermal insulation value, while at the same time avoiding the thermal bridging common with other construction methods. Considering the growing importance of energy-efficient building methods, timber construction will play an increasingly important role in the future."

Dipl.-Ing. Markus Julian Mayer (Architect BDA) and Dipl.-Ing. Cathrin Peters Rentschler, Munich, Germany.

Flexibility

The flexibility of timber construction methods makes it easier to vary a building's orientation on site, its floor plan, the number of rooms, the interior design and the overall appearance, while timber's thermal efficiency means walls can be slimmer, releasing up to 10% more space than other building methods.

External finishes depend on personal preference; walls can be clad in wood, tiles, brick, or plastered; roofs can be clad in tiles, slates, concrete or metal.

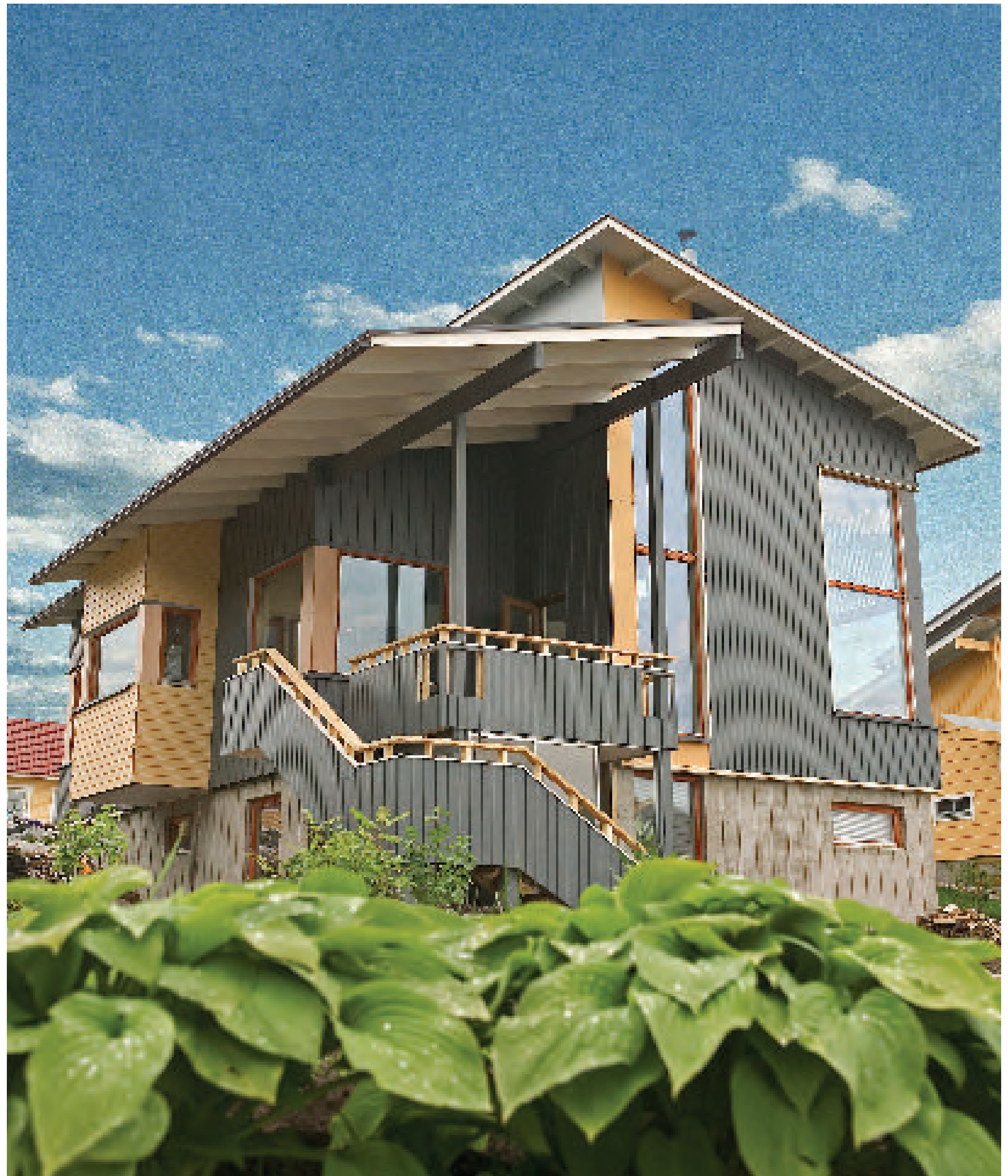
Previous page

Gallery staircase of Petajavesi Church, Finland

Photograph by Will Pryce from the book 'Architecture in Wood'

Opposite left and right

Timber building is part of future energy efficient building



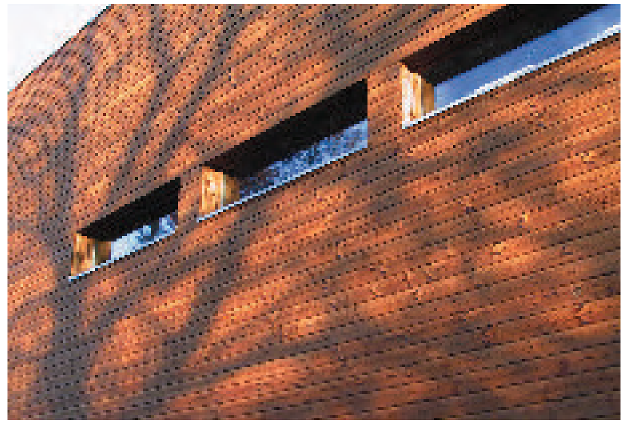
Fire prevention

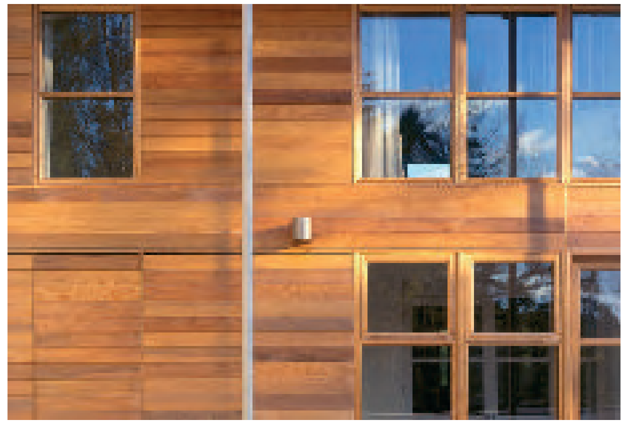
Unlike many other materials, timber behaves predictably in fire, forming a charred surface which provides protection for the inner structure, so that timber elements can remain intact and fully load-bearing during a fire.

The fire-retardant detailing of modern timber construction prevents cavity fires and the spread of combustion gases.

"We believe in wood as a building material. It is a sound choice, so long as fire prevention and building regulation requirements are complied with. Timber construction makes our job easier because it remains stable longer, burning slowly, steadily and predictably. Its behaviour can be calculated, allowing us to estimate load-bearings and the critical points in the building. Its predictability puts us in control, so that we can enter the building to extinguish the fire. The failure of a wooden structure is foreseeable, whereas a steel structure will lose its stability suddenly and without warning. We therefore think modern timber houses are a good thing."

Wilfried Haffa, commander of Rietheim-Weilheim's volunteer fire brigade in Germany, whose technical centre is built in timber.





Sound insulation

Modern timber buildings readily comply with sound insulation standards through using a layered structure of different materials. Even more demanding standards can be met using a number of different design solutions.

Durability

With good design and correct detailing, structural wood needs no chemical treatment to achieve a long life. Wood is resistant to heat, frost, corrosion and pollution; the only factor that needs to be controlled is moisture.

Timber construction materials are kiln-dried to specified moisture levels, removing the need for chemical wood treatment in interior use.

Externally, design elements, such as large roof overhangs and sufficient distance between timber and ground are important. Timber facades are non-load bearing and therefore do not require treatment. However, extended life spans can be achieved by using heat treated timber, special timber qualities, treatments or decorative finishes.

Timber cladding

Architects are increasingly turning to timber cladding for renovations as well as new buildings as a way of achieving a contemporary, yet natural look: a timeless elegance and simplicity.

Apart from its aesthetic advantages, timber cladding's light weight makes handling and transport simple. Used in combination with insulation materials, it keeps brick walls frost free, reduces heating costs and provides a more comfortable interior.

Timber cladding can be fitted to any exterior wall, timber, concrete, or brick, and is as popular for larger industrial and showcase public buildings as for housing.

Wooden windows

Nowadays wooden windows can be highly engineered components, built to the most demanding thermal and security specifications, with low maintenance intervals and a long service life.

Wooden windows have many distinct advantages: they look and feel right, they can be supplied in a number of colours or stains and to a wide range of designs, they are more thermally efficient, they resist 'cold-bridging', they can be rectified if damaged, and they are made from sustainable materials.

Above left

Cladding is becoming increasingly popular for residential and commercial buildings. This building is clad in Thermowood® heat treated timber

Above right

Wooden windows can meet the most demanding thermal and security specifications

Kindrochet Lodge, Perthshire © Wood Awards 2005

Opposite above left

Wooden houses can incorporate the latest energy saving technology

Opposite below right

Timber has high resistance to chemicals

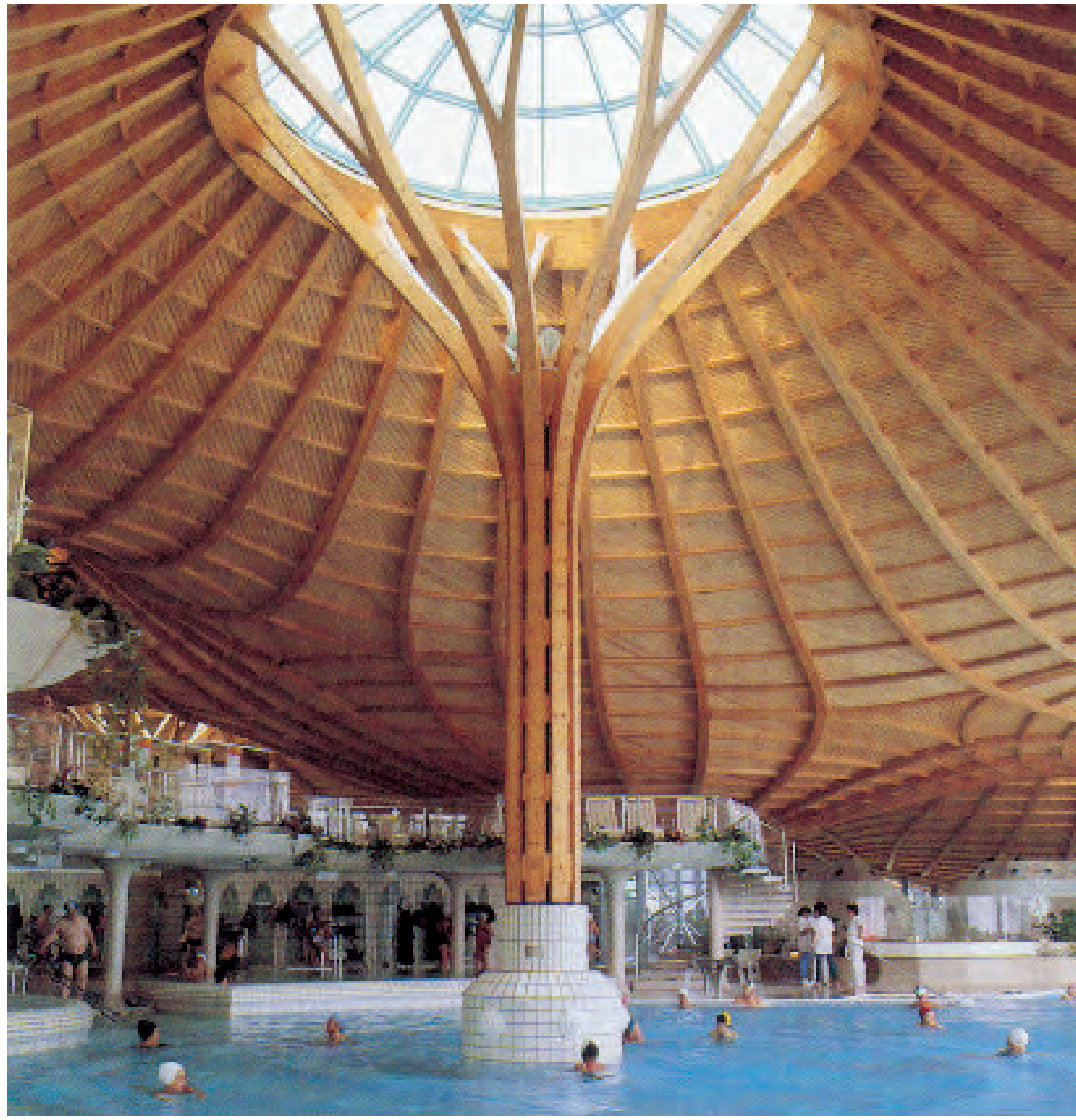
Picture of Solemar salt-water baths in Bad Dürrheim, Germany

House technology

Timber houses are not only the most economical and environmentally-friendly, they also provide the best platform for integrating modern technology systems like controlled ventilation and air extraction, heat recovery and solar panels, many of which are now installed as standard practice.

Wood in the renovation of old buildings

Wood and wood-based materials have a number of advantages when used in the renovation of old buildings, quite apart from their aesthetic value, the most important of which is probably ease of use. Wood components do not generally require heavy lifting gear, and they are easy to fit and work with. Wood's thermal insulation and humidity control properties make it comfortable to live with, while its relatively low cost and long durability make it highly cost-effective.



Living with wood

A sound investment

Wooden houses are inexpensive to build and extend, and enjoy low running and maintenance costs over a long life. A study of whole life costs, carried out in 2002 by the chair of steel and timber building at the University of Leipzig in Germany, found that professionally designed and constructed timber houses are at least as sound a long term investment as any other.

Today the average service life of a wooden house is between 80 and 100 years, with some builders guaranteeing a lifetime of 125 years. In fact, timber houses can last many hundred years, as witness the many examples surviving from the Middle Ages.

Maintenance costs for timber buildings are no higher than for others. Wooden facades, with or without a surface coating, merely require ordinary maintenance.

Above

Timber is an ideal material for loft conversions

Below

Temperature profile in colours of a floor-wall detail

INFORMATIONSDIENST HOLZ hh 3 2 2
Holzbau und die Energieeinsparverordnung;
Univ.-Prof. Dr.-Ing. Gerd Hauser et al

Opposite

These fishermen's cottages in Bergen, Norway were built in the 19th century

Photograph by Will Pryce from the book 'Architecture in Wood'

Adapting to changing needs

Houses need to be able to adapt to changes in the life-stages of their occupants, as well as to wider changes in the way people live.

Thanks to the light weight and modular structure of timber houses, loft conversion, adding an extra storey or an extension, removing a wall, or just modernization, are simple and practical, while the dry lining used in timber construction means less waste and moisture.

In many cases a loft conversion is only possible in timber, where the low net weight and exceptional strength of wood elements ensure adequate load-bearing, even over considerable spans.

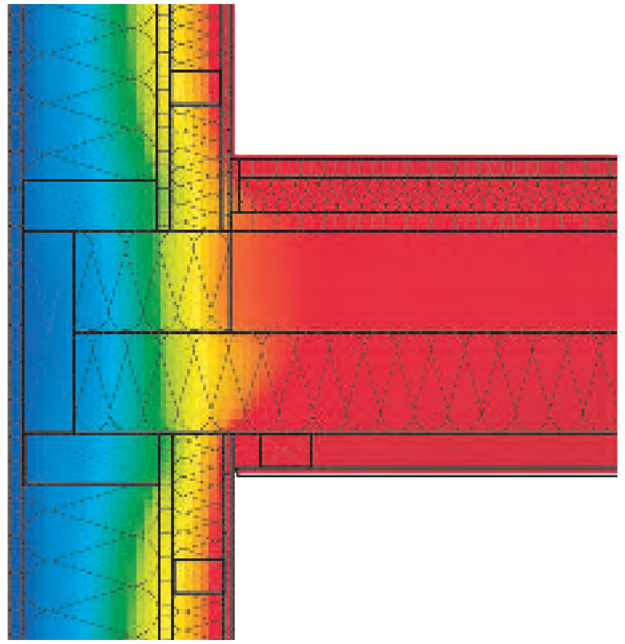
Timber construction reduces the build time for extensions, and the light weight of the components means they can be delivered even to sites with severely restricted access.

With the proper planning, not only windows and doors, but also many domestic installations can be integrated at the prefabrication stage.

Greater comfort, lower bills

Wooden houses set the standard for heat insulation, as timber's cellular structure gives it natural thermal insulation qualities that are superior to any other building material, keeping out the cold in winter and the heat in summer.

Wooden houses, built to standard construction methods, easily meet thermal insulation regulations. However, with additional insulation, it is quite practical to build ultra-low, or even zero energy houses using timber. Smaller capacity heating systems mean significantly reduced running costs.



Wood makes a natural case for itself inside the home from a practical as well as an aesthetic point of view. And nothing else has such timeless good looks or provides such a sense of well-being.

Panelling

Wood panelling, whether contemporary or traditional, painted, stained or natural, adds character to a room, while covering defects, improving insulation, balancing humidity, and providing a robust and maintenance-free surface. The older it gets, the more beauty and character it develops.

Ceilings

Wood panelling is particularly popular for ceiling, covering irregularities, minimizing maintenance, and simplifying the fitting of lighting and ventilation systems.

Floors

Wooden floors are beautiful, practical, healthy, durable and excellent value. They are hard wearing, yet warm to the touch, with enough 'give' to be comfortable. They protect against static electricity, offer no hiding place for dustmites and will provide natural humidity control.

Furniture

Wooden furniture combines timeless beauty with robust practicality, whether a modern style statement, or a rustic classic; whether hand-crafted objects made with exotic hardwoods, or mass-produced pieces made from plantation softwoods, which are increasingly being engineered to provide ultra high performance elements for the manufacturing industry.

Wood's strength, light weight and stability mean wooden furniture is exceptionally durable, ageing gracefully over the years.

Healthy living

Wood creates naturally healthy living conditions. It is easy to keep clean, helps maintain an optimum humidity balance, helps a room warm up more quickly, and keeps condensation to a minimum.

Wood in the garden

The tradition of fencing off gardens and external sites with wood is centuries old, and wood remains the material of choice for modern gardens.

It is inexpensive, simple to transport and handle and fits into the natural surroundings of landscape and garden. The possibilities are endless, from fencing to decking, pergolas to pagodas, planters to glasshouses.

Above

Wood blends into the natural surroundings of landscape and garden

Opposite above

Wood creates a warm, clean stylish attic bedroom

Picture © Åke Eson Lindman

Opposite left

Domestic fireplaces keep up with modern technology

Heating with wood

Over recent decades forest growth has considerably exceeded fellings. Not only is there an overwhelming environmental case for using more of this abundant renewable supply, but there is an increasingly compelling economic case, because of wood's relative price-stability. Modern wood heating plants, as well as domestic fireplaces, comply with the most up to date requirements of energy and heating technology.

Wood and chemicals

The processing and finishing technologies for wood often require the use of chemicals, in the form of adhesives, paints and coatings, as well as products to improve wood's biological durability and moisture resistance.

The application of wood preservatives happens under very strict control in closed systems and conforms to the relevant European and national regulations. Pressure treated timber for construction, agriculture, landscaping, garden products, marine, railway and many other applications, enjoys an extended service life and provides a good, environmentally conscious alternative to non-renewable materials.

Formaldehyde is a simple but essential organic chemical that occurs in most forms of life, including humans. It is naturally present in trace amounts and is also used in formaldehyde-based resins in the manufacture of commonly used wood products. The World Health Organisation provides an advisory limit of concentration of formaldehyde in indoor air of a maximum 0,1 mg/m^3. Comprehensive indoor air studies confirm that the level of formaldehyde in European homes is on average only one third of the guideline. The limit value for the strictest formaldehyde class (E1) in the European standards for wood-based products is linked directly to this WHO guideline. Although those wood-based products still emit some formaldehyde, they remain at a level very substantially below WHO recommendations. The use of formaldehyde ensures good quality wood-based products can be produced affordably.

The Industry: facts and figures

European industry employs nearly 3 million

Worth €165 000 million annually

The construction sector shows strong growth

New Member States provide opportunities

Europe is the world's largest furniture producer

The industry is co-operating to promote wood

Industry significance

Key characteristics

A driving force of the global economy

The woodworking industry is a major employer in many of the Member States of the European Union and features among the top 3 industries in Austria, Finland, Portugal and Sweden.

A provider of welfare in Europe

The woodworking industry provides jobs to more than 2,7 million people in the EU 25. In common with all traditional industries, it plays an important part in achieving the Lisbon goal of becoming the world's most competitive region.

A contributor to rural development

Firms are often located in remote, less industrialized or developed areas, making an important contribution to the rural economy.

A diversified industry

The industry covers a wide range of activities, from sawmilling, planing and pressure treating to the production of wood-based panels, veneers and boards; from construction products to joinery; from pallets and packaging to furniture.

An industry of Small and Medium Sized Enterprises (SMEs)

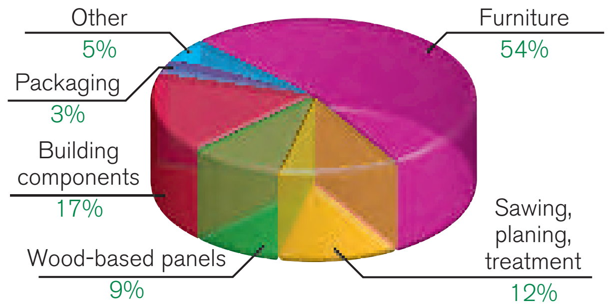
The companies within the woodworking industries are mostly SMEs, with only a few large groups, typically in the softwood sawmill, panel and parquet sectors, operating on a European or global scale.

The total number of businesses in the EU 25 wood industry is estimated at 131 000 and in the EU 25 furniture industry at 136 000.

Represented by CEI-Bois

The industry is represented, on a European and international level, by CEI-Bois, the European Confederation of Woodworking Industries. CEI-Bois includes national members, as well as European trade organizations representing the different sectors of the woodworking industry. At the end of 2005, CEI-Bois counted among its members 8 European (sub-sector) federations and 25 federations from 21 European countries.

The EU 25 woodworking industry sectors



Below

The importance of the different sectors of the EU 25 woodworking industry, by production value – total value €165 000 million in 2003

Opposite above left

EU 15 and EU 25 employment by industry sector, 2003
EUROSTAT

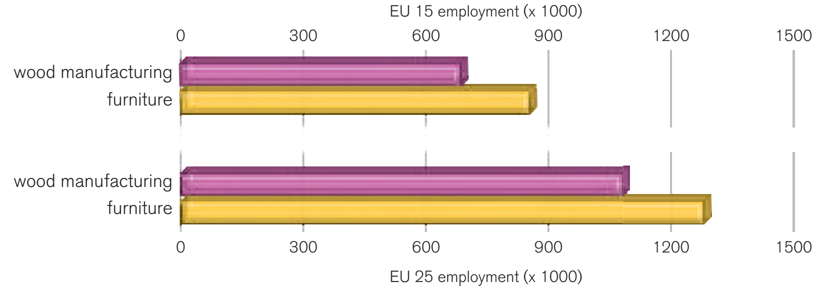
Opposite above right

Automation in a factory

Opposite below

The manufacture of a curved glulam beam

EU employment by sector



Industry value

Below

Production value per EU Member State in 2002-2003

Opposite above right

The turnover of the EU 25 woodworking industries totalled €165 000 million in 2003

Opposite above left

Relative importance of sectors in new Member States

Opposite below

Complex shapes can be created using Engineered Wood

The turnover of the EU 25 woodworking industries totalled €165 000 million in 2003.

54% of this was accounted for by the furniture sector and 46% by the woodworking sector, representing a record €72 600 million.

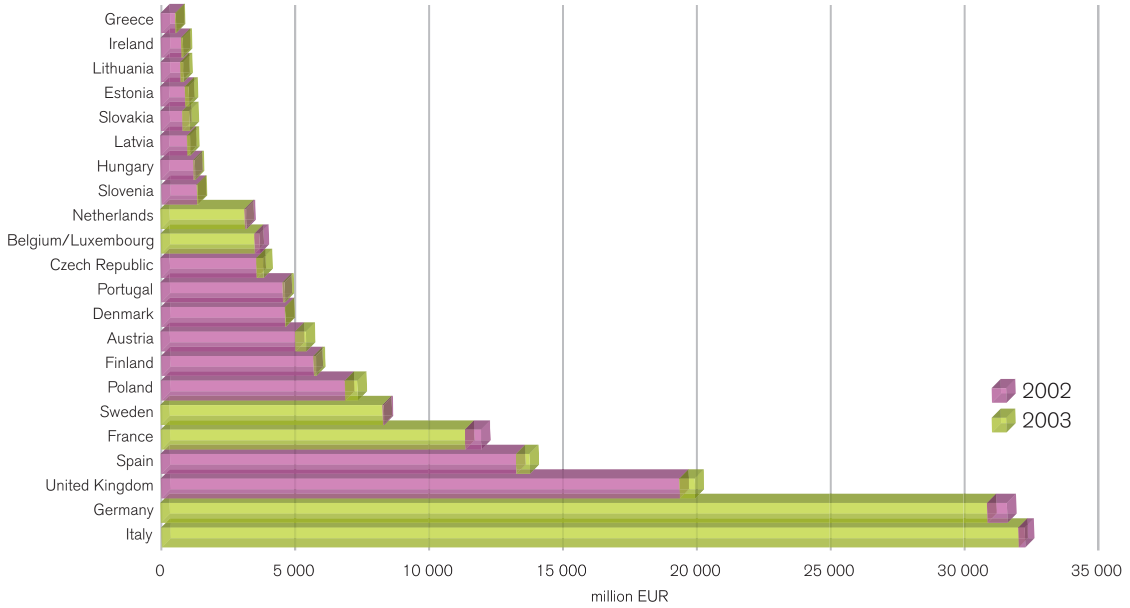
EU manufacturing is dominated by Italy and Germany, with Italy having overtaken Germany in 2002. The UK follows at some distance in third position, followed by Spain and France.

Within the new Member States, the picture is rather different, with the woodworking sector accounting for 59% and the furniture sector 41%.

Together they represent some 11%, or €18 200 million, of the total EU 25 industry output value.

Over 40% of this comes from Poland, followed by the Czech Republic with 21%, and Slovenia and Hungary, with just over 7% each.

Production value per EU Member State in 2002-2003



Relative importance of sectors in new Member States

The Baltic States registered double-digit growth in 2003, while Slovakia recorded the strongest growth of all, with an overall increase of 34%, mainly thanks to a booming furniture sector.

Industry sectors

The construction sector

The performance of the woodworking industries, even the furniture sector, is highly dependent on the performance of the construction industry, as the vast majority of the products manufactured by the European woodworking industry find their way into the construction sector, both for structural and non-structural applications, as well as for decorative purposes, such as furniture. The industry therefore makes a significant contribution to a building segment that represents 12% – 14% on average of EU Member States' GDP.

In the short term, little growth is expected from new construction in Western Europe, most coming from Eastern Europe and from RMI (Repairs, Maintenance and Improvement), which currently accounts for roughly 50% of the total residential, and 40% of the non-residential, construction markets in Western Europe; 35% and 25% in Eastern Europe.

Timber frame's share of residential construction is growing, particularly in Central Western Europe and the United Kingdom, with the number of timber frame houses expected to increase by 2010 by between 30 000 and 60 000 in Western Europe, where market share is around 7%, and by around 3 000 to 6 000 in Eastern Europe, where market share is nearer 3%.

The disparity between Western and Eastern European construction output growth is forecast to widen, with Western Europe only forecast to grow by 5% by 2007, compared with Eastern Europe's 22% growth. Eastern Europe will remain attractive to foreign investors, as EU membership implies less bureaucracy and positive trading conditions with other member states.

Above left

The EU furniture sector was worth €76 800 million in 2003

Above right

The sawmill industry is investing in new technologies

Opposite

By 2010, 33 000 – 66 000 extra timber frame houses are expected to be built in Europe

The furniture sector

In 2003 the sector was worth €76 800 million. Of the seven major global furniture manufacturing countries (the US, Italy, Germany, Japan, Canada, the UK, and France) four are European, accounting together for about 30% of total world production and almost half of total world exports.

Europe still remains the world's largest furniture producer, but imports to the EU have risen by more than 20% since 2000, to over €13 000 million in 2003, and Asia is becoming an increasingly significant competitor.

The sector is a major user of wood-based panels, but also an important user of sawnwood, especially hardwood. Therefore, the development of the European woodworking sector is closely linked to the furniture sector.

In countries like France, Italy and Spain, the furniture sector consists largely of small, artisan companies, whereas German manufacturers tend to be larger and more industrialized, with half of their market accounted for by companies with over 300 employees. In the key Eastern European countries, furniture production is concentrated within just a few large companies.

New technology

The wood processing industries in Western Europe have experienced some of the highest raw material and labour costs in the world, forcing them to adopt leading edge technologies to remain competitive and profitable. However, the technological advances are not restricted to processing alone. Functions such as logistics, transports, procurement, etc. have all benefited from technological development, enhancing both the quantitative and qualitative competitiveness of the industry.

Technical development has been led by the major exporters like Finland and Sweden, and is now widely spread within the sawmill industry, driving cost-efficiency and developing more value-added products and services. Industry consolidation is leading to higher production from fewer units, as well as greater specialization and improved customer focus.

In the MDF, OSB and particleboard industries, the most important technical development over the last decades has been the continuous pressing technology that has dramatically reduced production costs through economies of scale and better process control.

As labour is such a major cost element for joinery and furniture businesses, European companies have had to adopt computer aided technologies and processes, shifting the emphasis from the primary processing of wood to the finishing and assembly of products.

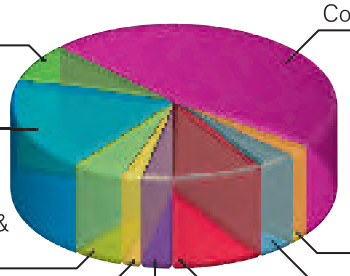
Wood products

Sawnwood

The sawnwood sub-sector represents 12% of the overall EU 25 woodworking industry, producing around 91 million m³ (€13 000 million) in 2004 from 9 000 companies, employing 268 000 people.

Sawnwood products are used mainly in industrial and structural applications, such as building components (timber frames, flooring, decking, joinery etc.), and in domestic applications for panelling, built-in fixtures, furniture and finishing.

Softwood timber consumption



Softwood sawnwood

The sector is consolidating. The top ten producers, typically world-scale multi-national forest products businesses, increased their share of the market from 15% in 1995 to 25% in 2004.

Hardwood sawnwood

EU 25 production increased by a significant 6,7% in 2004, led by France, while demand grew by 5,2%, thanks to increased housing starts.

This part of the industry is relatively fragmented, consisting of a large number of smaller businesses. Production is on a local, regional or national level, exploiting niches created through local forest resource or markets, but with growing international sales. Industry consolidation is low, although forward integration into secondary wood processing is significant, serving specific product or market needs.

Left

Estimated consumption of sawn softwood timber in the main importing countries in Europe. Figures for the UK, France, Spain, Italy, Germany, Netherlands, but typical of many other countries

Jaakko Pöyry Consulting

Opposite above left

Sawnwood represents 12% of the EU 25 woodworking industry

Opposite above middle

Parquet production has been increasing steadily for the last 15 years

Opposite below

The joinery sector has an annual EU 15 turnover of €12 000 million

Parquet

In 2004 the member countries of the European Federation of the Parquet Industry (FEP) produced about 91 million m² of parquet (solid and multiply). Production has been increasing steadily for over 15 years and European producers lead the way worldwide in product development and innovation.

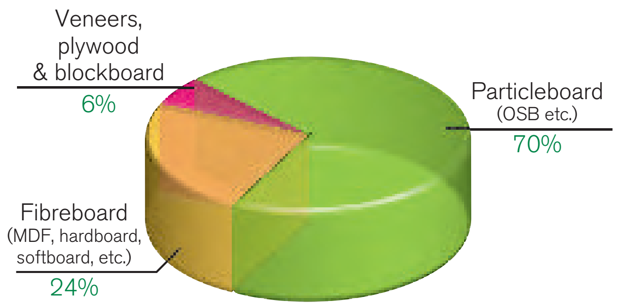
Western Europe accounts for over 90% of total European parquet consumption, with Germany, Spain and Italy the largest markets. In Eastern Europe, Slovakia and Hungary form the largest markets, benefiting from increasing parquet availability from local industry. In addition, overall consumption in Eastern Europe is predicted to increase towards 2010, taking an increasing share of European consumption as a result of a rapid growth in renovation, as well as new construction.

Even though the parquet industry is driving secondary wood product industries' consolidation, the market share of the 5 leading companies is still only around 35%.

Joinery

Joinery covers all carpentry work used in construction including doors, windows, roof trusses, etc. The sector has about 24 000 companies in the EU 15, employing 250 000 people, with a turnover of €12 000 million a year. Although the majority of companies are SMEs, the trend is towards consolidation.

The sub-sectors within the wood-based panels sector



Wood-based panels

This is an important sub-sector, accounting for 9%, or €13 billion, of total industry production, employing around 80 000 people within the EU.

Wood-based panels are used as intermediate products in a wide variety of applications in the furniture industry, the building industry (including flooring), the packaging industry, or as 'do-it-yourself' products.

The most important end-users for plywood and OSB are the construction market and the packaging industry, although plywood also enjoys specific niche markets, such as transport, boat building and musical instruments.

The furniture industry is the main user of particleboard (41% in 2004), while laminate flooring is a booming market for MDF and now accounts for more than 40% of all applications. In fact, laminate flooring is at present the fastest growing product in the woodworking industry.

Thanks to major growth and consolidation amongst the Western European producers of reconstituted wood-based panels (Particleboard, MDF and OSB), manufacture is concentrated into a few dominant world scale companies, operating multi-nationally. These businesses are increasingly establishing production and extending markets in Eastern Europe, utilizing the benefits of low cost production and growing markets. This growth is partly caused by the relocation of secondary wood working businesses from Western to Eastern Europe.

The plywood and hardboard businesses are only now on the way to consolidation.

Above

The sub-sectors within the wood-based panels sector

Below

Particleboard, MDF, laminate veneer, OSB

Opposite above left

More than 350 million pallets are produced in Europe annually

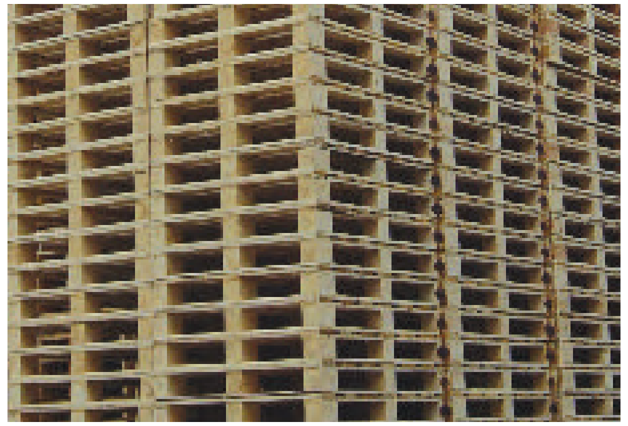
Opposite above right

LVL joists and beams

Opposite below

Glulam beams used in New Faculty of Education, Cambridge University, UK

Photograph courtesy of the Wood Awards 2005



Engineered wood products

Engineered wood products, including glulam, I-joists and laminated veneer lumber, provide real competition for concrete and steel beams and are increasingly used by architects in structural applications, especially for large-scale constructions like bridges, sport halls, and university buildings, while high value defect-free products, like finger-jointed and stress-free timber, are popular in the joinery industry. Annual production is about 2,5 million m^3, of which glulam accounts for 2,3 million m^3.

Large multinational companies operating in international markets are increasingly dominant in this sub-sector, especially in LVL and I-joists. However, smaller scale businesses, active on a national level, are also responsible for an important share of glulam beam production.

Pallets and packaging

Around 20% of all timber consumption in Europe is used for wooden pallets and packaging, with over 350 million wooden pallets produced in Europe every year. The sector represents 3% of the EU woodworking industries, with 3 000 companies employing about 50 000 people.

Production in Europe is still fragmented, with a large number of small and medium sized players operating nationally. However, due to standardization and trade within the Euro zone, a few large groups are beginning to operate on an international scale.

Promotion and research initiatives

FTP and other research activities

The European Confederation of Woodworking Industries (CEI-Bois), the Confederation of European Forest Owners (CEPF), and the Confederation of European Paper Industries (CEPI) have set up a project to establish a Technology Platform for the forest-based sector (FTP). The FTP is an industry-driven project aimed at establishing and implementing the sector's R&D roadmap for the future and is supported by a wide range of different stakeholders.

To achieve the forest-based sector's 'Vision 2030', seven research priorities will be addressed within the FTP's Strategic Research Agenda (SRA). The SRA is the first research programme to integrate all relevant European networks and industry initiatives, within a guaranteed geographical balance.

The work for the FTP is compulsory for the Framework Programme 7 (FP7) of the European Commission, which will run from 2007 to 2013. Technology Platforms are the main 'channels' for giving specific inputs to the work programmes and for cooperation with the European Commission in the relevant field.

EFORWOOD

EFORWOOD is a recent European co-operative research project on sustainability in the forest-based sector. It aims to develop mechanisms to be used for evaluating and developing wood's contribution to sustainable development. The project will cover the whole European chain, from forestry to industrial manufacturing, consumption and recycling of materials and products.

EFORWOOD will have a budget of €20 million, run for four years and involve 38 organizations from 21 countries. This is the first project of the whole European forest-based sector to be financed by the European Commission, which will cover €13 million of the budget.

European Wood Initiative

When exporting overseas to markets like Asia, European producers face strong competition from the North American wood industries, which can invest heavily in standards development and promotion thanks to the financial support they receive.

The European Wood Initiative has been established to help companies compete in China and Japan.

Opposite above

Building Europe magazine

Opposite below

The European Wood Initiative has been established to help companies compete in China and Japan

Activities by the European institutions

In 1995, it was decided to create a 'Forest-based Industries Unit' within DG Enterprise. This unit is crucial for monitoring all relevant developments in the sector and for ensuring the voice of the sector is heard within the EU Commission services.

COST

COST (European Cooperation in the field of Scientific and Technical Research) activities, largely financed by the EU, originally involved academic scientists, but are now gradually reaching industry partners. The Technical Committee on Forests and Forestry Products provides an effective forum for the industry to meet academic researchers.

Source: www.europeanwood.org

Communication and wood promotion activities

Several EU member states have invested in national wood promotion campaigns. These have now been joined by a number of pan-European projects promoting wood in Europe, but also in third world markets, such as Asia.

Roadmap 2010

Under the umbrella of CEI-Bois, this is the industry's first strategic project aimed at making wood and wood-based products the leading material in construction and interiors by 2010. The programme incorporates lobbying, promotion, R&D and skills training.

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Definitions of terms

Sawnwood products
Mainly used in industrial and structural applications, such as building components (timber frames, flooring, decking, joinery, etc.) and in domestic applications for panelling, built-in fixtures, furniture and finishings.

Glulam (glued-laminated timber)
A structural timber product manufactured by gluing together individual pieces of lumber under controlled conditions. Attractive and capable of bearing loads across a considerable span, glulam is increasingly used as an architectural and structural building material for columns and beams, and frequently for curved members loaded in combined bending and compression.

I-joists
Looking like an uppercase "I", and made up of a top and bottom flange of sawn or structural composite lumber (LVL) and a web (the vertical piece) of plywood or OSB.

LVL (laminated veneer lumber)
Made by gluing layers of softwood veneers together to form a continuous sheet. The grain runs lengthwise in all layers. Depending on the application, LVL sheets are cut to form panels, beams or posts.

MDF (medium density fibreboard)
A wood-based panel manufactured from lignocellulosic fibres under heat and pressure with the addition of an adhesive.

OSB (oriented strand board)
An engineered wood structural panel, in which long strands of wood are bonded together in a particular direction with a synthetic resin adhesive.

Particleboard
A wood-based panel manufactured under pressure and heat from particles of wood (flakes, chips, shavings, sawdust etc.) and/or other lignocellulosic material in particle form, with the addition of an adhesive.

Plywood
A wood-based panel which combines good mechanical strength with light weight. It consists of sheets of wood veneer, glued together and constructed with cross-bonded plies. The grain of each layer is perpendicular to the plies above and below it. The outer plies usually have the grain going parallel to the long dimension of the panel. This construction guarantees the strength and stability of plywood and gives it a high resistance to shocks and vibration, as well as to strain, splitting and warping.

Wood-plastic composites
Produced using fine wood fibres mixed with various plastics (PP, PE, PVC). The powder is extruded in a dough-like consistency to the desired shape. Additives such as colourants, coupling agents, stabilizers, blowing agents, reinforcing agents, foaming agents and lubricants help tailor the end product to the target area of application. With up to 70% cellulose content, wood-plastic composites behave like wood and can be fashioned using conventional woodworking tools. Their extreme moisture-resistance makes them popular for decking, cladding, park benches, etc. There is also a growing market for indoor uses such as doorframes, trim and furniture. The material is formed into both solid and hollow profiles. The wood-plastic-composites-sector is one of the most dynamic of all the new composites sectors.

Certification schemes
ATFS (American Tree Farm System), CSA (Canadian Standards Association), FSC (Forest Stewardship Council), MTCC (Malaysian Timber Certification Council), PEFC (Programme for the Endorsement of Forest Certification Schemes), SFI (Sustainable Forestry Initiative).

Coppice
Forest comprised of shoots sprouting from tree stumps, left after harvesting, which can grow into new trees

Europe
Austria, Belarus, *Belgium/Luxembourg, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom,* Albania, Andorra, *Italy, Latvia,* Liechtenstein, Bosnia/Herzegovina, Bulgaria, Croatia, Iceland, Republic of Moldavia, Romania, Russian Federation, San Marino, Macedonia, Ukraine, and Yugoslavia. (EU 25: countries in italic).

Fellings
Average (annual) standing volume of trees, living or dead, measured over bark, that are felled during the given reference period, including volume of trees or parts of trees that are not removed from the forest, other wooded land or felling sites.

Forest
Land with tree crown cover (or equivalent stocking level) of more than 10% and area of more than 0,5 ha. The trees should be able to reach a minimum height of at least 5m at maturity in situ.

Natural regeneration
Re-establishment of a forest stand by natural means, i.e. by natural seeding or vegetative regeneration. It may be assisted by human intervention, e.g. by scarification or fencing to protect against wildlife damage or domestic animal grazing.

Semi-natural
Consists of trees which would occur naturally on a specific site and show similarities to primary forest. They can be regarded as a reconstruction of the natural forest cover achieved by using various silvicultural practices. Includes planting and seeding of native species.

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