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ENVIRONMENT AND SUSTAINABILITY

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IMPRINT

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CONTENT

ENVIRONMENT & SUSTAINABILITY

The climate change that has been experienced over the last decades, global warming, the increase in natural disasters and the possibility of using wood to usefully counteract greenhouse gas emissions, have prompted us to dedicate the first chapter of our handbook to the topic of environment and sustainability.

On the following pages we deal with those greenhouse gas emissions for which we humans are responsible – especially the topic of CO_2.

We take climate protection and climate goals seriously. It is therefore all the more important to know that wood makes a significant contribution to the attainment of climate goals.

It is important for us to make an active contribution to the protection of our environment, in order for it to remain inhabitable for the next generations. With this brochure we address especially the architects & planners and construction companies, but also private and public builders and developers to whom environment and sustainability are an important concern.

01 CLIMATE CHANGE

The reason for global warming and the climate change that goes with it lies in the big increase in greenhouse gas emissions into the atmosphere. In this context it is important not to seek the cause in the natural greenhouse effect, without which life on earth would not even be possible, but much more in the anthropological greenhouse effect, largely caused by CO_2 emissions.

1.1. CONSEQUENCES OF THE CLIMATE CHANGE

There is no doubt that the climate will change. In the first half of this century, an increase of the average temperature by 0.1 – 0.4°C is expected in an interval of 10 years. About 55 – 70% of the additional greenhouse effect is caused by CO_2. Experts reckon with a yearly increase in CO_2 emissions of 0.5% – as a result the CO_2 concentration could double by the year 2100.

Documented impact that can be attributed to the climate change:

- Melting of ice at the North Pole
- Rise in sea levels
- Melting of glaciers
- Increase in natural disasters
- Increase in tornados

Illustration 1 – Hurricane Ivan, destruction not only above the water, © Getty Images/NOAA

Predicted effects in connection with the climate change:

- Further rising of sea levels and danger for coastal inhabitants
- Extinction of some plant and animal species
- Increase in illnesses due to rise in temperature

1.2. THE NATURAL GREENHOUSE EFFECT

In principle, the greenhouse gases of the atmosphere – especially water vapour (H_2O), carbon dioxide (CO_2), ozone (O_3), nitrous oxide (N_2O) and methane (CH_4) – make life on earth possible in the first place. If the natural greenhouse effect did not exist, the average temperature on earth would be -18°C.

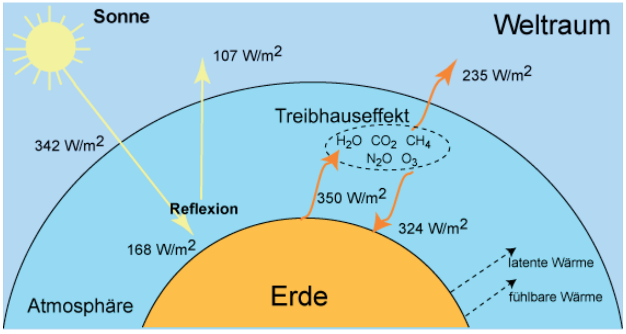


Illustration 2 – Diagram of natural greenhouse effect, www.bildungsserver.hamburg.de

The natural greenhouse gases in the atmosphere are responsible for warming the surface of the earth, starting at temperatures of -18°C to +15°C. This 33°C warming is called the “natural greenhouse effect”. The tracer gases let short-wave sun rays through and at the same time absorb the long-wave heat radiation reflected from the earth.

1.3. ANTHROPOGENIC GREENHOUSE EFFECT – ANTHROPOGENIC GREENHOUSE GASES

When talking about the greenhouse effect and its negative effects, we essentially mean the anthropogenic greenhouse effect, for which humans are partly responsible themselves. The reasons for the unnatural increase in concentration of the greenhouse gases, especially CO_2, can be found in the burning of fossil energy sources, in the changing and more intensive use of land, as well as tropical deforestation, among others.

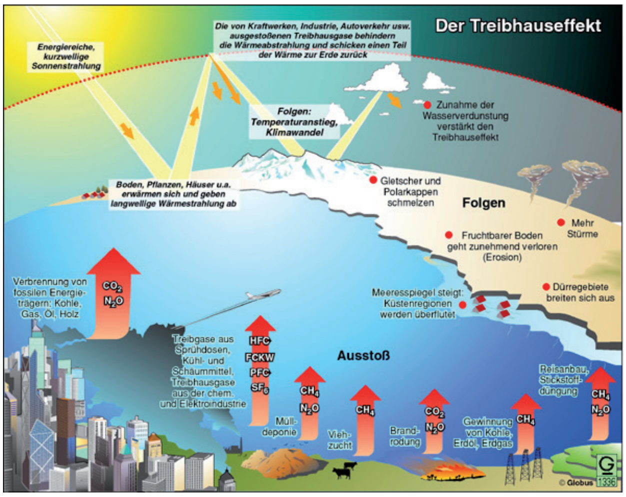


Illustration 3 – Diagram of anthropogenic greenhouse effect, © Globus

The anthropogenically released greenhouse gases include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_20), and also chloroflourocarbons (CFCs) and ground level ozone, to name some of the most important ones.

Share of anthropogenically released propellants associated with the greenhouse effect

The greenhouse potential is measured in carbon dioxide equivalents (CO_2-eq.). This means that all emissions are placed in relation to CO_2 regarding their potential greenhouse effect. Because the retention period of the gases in the atmosphere is included in the calculation, the time horizon must be specified for the estimation (usually 100 years).

Carbon dioxide (CO_2) is quantitatively the most significant greenhouse gas, with a percentage of about 50%, even though the specific climate effectiveness of other greenhouse gases is much higher. One unit of methane (CH_4), for example, is 21 times and nitrous oxide (N_2O) 310 times as climate-effective as CO_2.

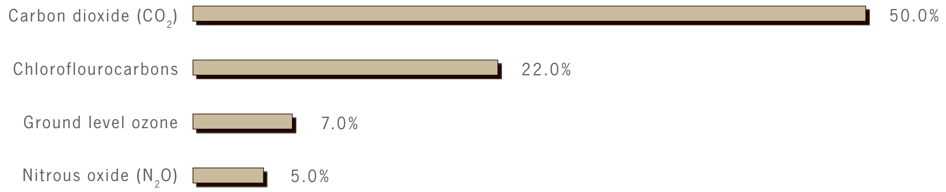


Illustration 4 – Percentage of anthropogenic greenhouse gases

Carbon dioxide (CO_2)

Share in greenhouse effect:	50%
Yearly emission:	25 billion tonnes
Causer:	Among others, exhaust fumes, burning of fossil fuels

Chloroflourocarbons (CFCs)

Share in greenhouse effect:	22%
Yearly emission:	1 million tonnes – 18,000 times more harmful than CO_2
Causer:	Among others, propellants, coolants, solvents

Methane (CH_4)

Share in greenhouse effect:	13%
Formed by:	Decomposition of organic material under exclusion of oxygen, incl. fossil fuels, in waste disposal sites and sewage works

Ground level ozone

Share in greenhouse effect:	7%
Harmful for:	Humans, animals and plants
Formed by:	Strong solar radiation from NOx and hydrocarbons
Causer:	Among others, exhaust fumes, domestic heating, industry, solvents

Nitrous oxide (N_2O)

Share in greenhouse effect:	5%, very long lasting, up to approx. 150 years
Formed by:	Micro-organisms by nitrogen-rich nutrition
Causer:	Among others, farming, burning of biomass and coal

Source: Felix Christian Matthes: Klimawandel und Klimaschutz, in: Informationen zur politischen Bildung 287/20 05, p. 21, http://www.bpb.de/publikationen/SKRBNR,0,Klimawandel_und_Klimaschutz.html (14.06.2007)

Share of industrial countries in the total CO_2 emissions worldwide (Coleman, 2002)

The USA has the highest share at 36%, followed by the EU at 24%, Russia at 17%, other countries at 14% and Japan with the lowest CO_2 emission of 9%.

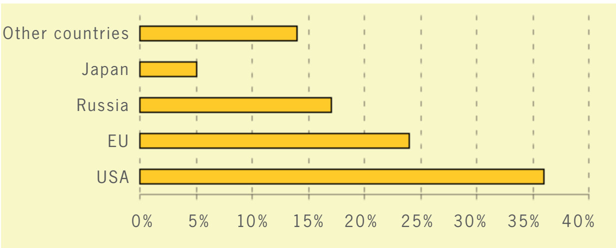


Illustration 5 – Share of industrial countries in the worldwide CO_2 emissions

1.4. AGENDA 21 – CLIMATE CONVENTION – KYOTO PROTOCOL

Climate protection has become a central environmental topic and has long since reached the notice of the general public. This has come, of course, against the background of divergent scientific and political positions, which have also determined the various Conferences of the United Nations on climate protection that have been held since 1992.

Conference on Environmental Protection in Rio de Janeiro, 1992, Agenda 21

Considering the global environmental situation and possible consequences of uncontrolled use of fossil fuels, at the up till then largest United Nations Conference (United Nations Conference of Environment and Development – UNCED, Rio de Janeiro, 3 – 14 June 1992) the Agenda 21 was adopted. Agenda 21 is a leading paper for sustainable development, which is to be seen as an environmental-political action programme for the 21st century at a local, regional and also global level.

Agenda 21 comprises 359 pages and 40 chapters on social and business aspects, covering everything from the conservation of important resources, the development of resources, to an agreed package of action to be taken, which primarily addresses international but also national governments. Also lower political levels were prompted to deal with the global problems, and to work out local solutions – to more or less develop a local Agenda 21. This was also a leading demand at the World Summit for Sustainable Development in Johannesburg in 2002.

Climate Convention, Rio de Janeiro, 1992

At the same time, in Rio de Janeiro, the UN Framework Convention was adopted as the first international agreement on climate protection, which came into force on 21 March 1994, having been ratified by 50 states. By 2008 about 141 further states, including Austria, had added their stamp. The aim of this Convention was to stabilise the anthropogenic greenhouse gas concentration at a level at which a dangerous malfunction of the climate system caused by humans can be prevented. This level should be reached over time, so that the ecosystems can adapt to the climate changes naturally, food production is not threatened, and economic development can continue in a sustainable manner.

The agreement records the combined responsibility of the states for the problems resulting from the climate change. At the same time this Convention emphasises the responsibility of the industrial states that on the one hand emit anthropogenic propellants and on the other hand have the financial means to take measures. A further policy of this Convention is to take into account the special needs of developing countries and to aspire to a provisional principle for the sustainable development of all states.

Kyoto Protocol

The provisions, strategies and conventions agreed on in Rio de Janeiro in 1992 formed the basis for a consensus in 1997 at a top-level conference in December 1997 in Kyoto, Japan. There a protocol was adopted in which for the first time, binding commitments for the emission of anthropogenic greenhouse gases in the industrial states were determined. This protocol is known as the Kyoto Protocol and stipulates that industrialised countries reduce their mutual greenhouse emissions by at least 5% compared to the 1990 level within a time period from 2008 to 2012. This legally binding commitment could mean a historical reversal of emission increases, which began in these countries about 150 years ago, even if the Kyoto Protocol has been criticised by some.

Aims of the Kyoto Protocol

The diagrams below show the targets set up to 2012 by the Kyoto Protocol (Illustration 6), the development from 1990 – 2002 (Illustration 7) and those countries with the highest CO_2 emissions due to burning of fossil fuels (Illustration 8).

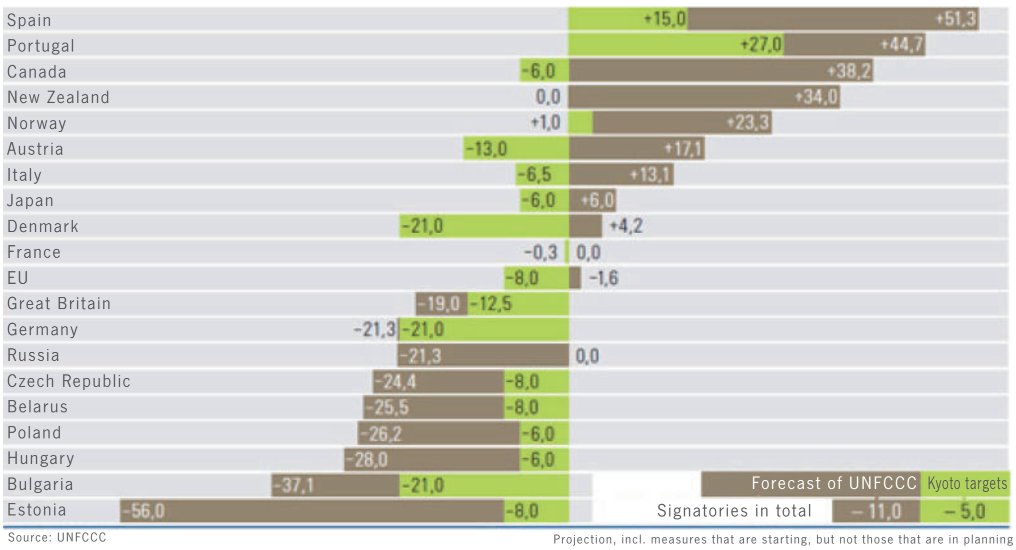


Illustration 6 – Climate targets determined in the Kyoto Protocol (Source: UNFCCC)

Obligations from the Kyoto Protocol and developments to date from 1990 – 2002

Contract parties	Reduction obligations	Emissions in 1990 in mt	Emissions in 2000 in mt	Emissions in 2002 in mt	Change 1990-2002
EU	-8 %	4 233	4 093	4 122	-2,6 %
Liechtenstein, Monaco, Switzerland	-8 %	53	53	53	-1,6 %
Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia, Slovenia, Czech Republic	-8 %	812	459	463	-43,0 %
USA	-7 %	6 129	7 038	6 935	+13,1 %
Japan	-6 %	1 187	1 337	1 331	+12,1 %
Canada	-6 %	609	725	731	+20,1 %
Poland, Hungary	-6 %	677	464	461	-32,0 %
Croatia	-5 %	32	26	28	-11,5 %
New Zealand	0 %	62	70	75	+21,6 %
Russia	0 %	3 050	1 876	1 876	-38,5 %
Ukraine	0 %	919	455	484	-47,4 %
Belarus	0 %	127	68	70	-44,4 %
Norway	+1 %	52	56	55	+6,2 %
Australia	+8 %	431	513	526	+22,2%
Iceland	+10 %	3	3	3	-4,2 %
Sum	-5,2 %	18 376	17 237	17 212	-6,3 %

Source: UNFCCC, the values relate to carbon dioxide equivalents without change in land use

Illustration 7 – Obligations from the Kyoto Protocol and developments until 2002

Countries with the highest CO_2 emissions due to burning of fossil fuels

	Country	CO_2 emissions from fossil fuel combustion in mt	Per capita emissions in t
1	USA	5.652	19,66
2	China	3.271	2,55
3	Russia	1.503	10,43
4	Japan	1.207	9,47
5	India	1.016	0,97
6	Germany	838	10,15
7	Canada	532	16,93
8	Great Britain	529	8,94
9	South Korea	452	9,48
10	Italy	433	7,47

Source: IEA, information as of 2002

Illustration 8 – Countries with the highest CO_2 emissions due to burning of fossil fuels

Criticism of the Kyoto Protocol

The industrial nations, including the countries from the former Eastern Bloc, should reduce their emissions by an average of 5.2% by 2012. Even official positions in the UN have determined that in fact a reduction of 60 – 80% would be necessary. Other countries, however, can increase emissions as much as they want, which means an increased burden especially for those countries that have tried to align with the industrial countries by maximising their industry in the last years. It is assumed that destruction of the world climate by anthropogenic greenhouse gases will not be reduced, but rather increased.

An important point of criticism of the Kyoto Protocol is the possible trading of emission rights, from which, according to some critics, in the end only the most influential and wealthy groups would profit.

The EU, Japan and the USA will hardly be able to keep their promises through climate protection measures alone, but rather by buying surplus emission amounts (emission rights) from the former Eastern Bloc countries, from Russia and the Ukraine (see Illustration 7 on page 9).

The logic of market forces means that sooner or later, a situation will arise where all available emission rights will either be used by the countries themselves or sold and used by others.

A further point of criticism is that so-called developing countries can increase emissions as much as they like, even if the difference to industrial countries is minimal currently.

Danger can be seen in increased industrialisation, especially in the emerging nations, and especially by large groups that invest in those countries.

Also through staging and implementation of climate protection projects in poor countries, so-called CDM projects, emission rights could be acquired.

Critics see a carte blanche for industrial nations to be able to emit even more greenhouse gas, having soothed their consciences by having carried out a climate protection project in exchange.

1.5. CLIMATE PROTECTION AND REACHING CLIMATE TARGETS

Within the term "climate protection" all possibilities for counteracting global warming are summed up, as well as all the measures for reducing the consequences – to prevent them is, according to numerous climate researchers and institutes, unlikely.

In connection with climate protection, there are two main approaches – on the one hand, the reduction of greenhouse gas emissions and on the other, the expansion of carbon sinks.

As well as an appropriate international climate policy, climate protection includes among other things:

- An increase in energy efficiency of power plants and manufacturing plants, which especially in countries outside of the EU often do not comply with today's state of the art
- The reduction of transport volume
- The use of renewable energies that are ideally CO_2 neutral in order to reduce the use of fossil fuels
- Measures towards energy saving and increase in the effectiveness of energy use
- Conservation of biodiversity
- A sustainable management of natural resources
- Use of renewable resources in the building industry

Obligations of the EU according to the Kyoto Protocol

The EU has committed itself to a reduction of greenhouse gas emissions by 8% in comparison to 1990. The time period for the agreement is the first commitment period from 2008 to 2012.

Within the EU the member states have entered reduction targets of varying ambition, which are dependent on political will and economic conditions for their success.

Obligatory emission limits compared with 1990 in % (EU countries)

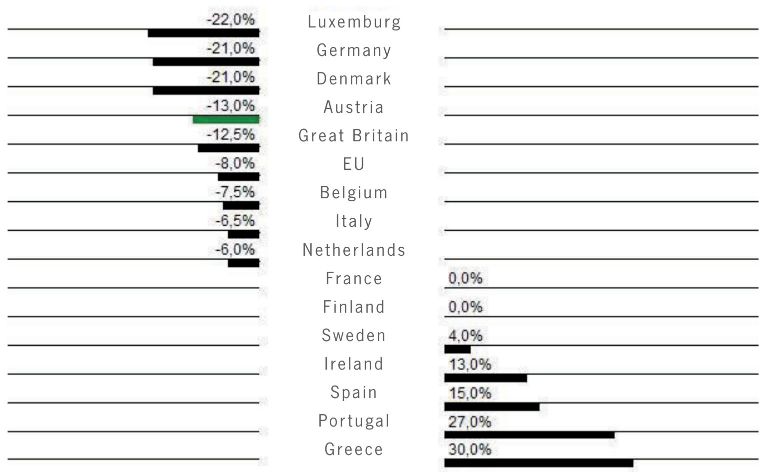


Illustration 9 – Obligatory limits compared with 1990 (EU countries)

Austria's obligations from the Kyoto Protocol

In Austria about 77 million tonnes of CO_2 equivalent in greenhouse gases were emitted in 1990. The stipulated reduction of 13% in the Kyoto Protocol means for Austria an obligatory saving of about 10 million tonnes of CO_2 equivalent compared to 1990. But because in the forecast models a further increase until 2012 of approx. 84 million tonnes of CO_2 equivalent is to be expected, to reach the target, realistically, a reduction of 17 million tonnes of CO_2 equivalent will be necessary. The necessity of swift and consistent action is therefore indisputable.

Austria's package of measures from the forest and timber industry:

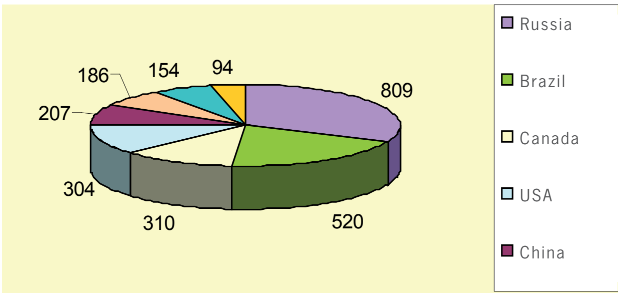
- Expansion of the wooded area in regions with low forest cover
- Sustainable forest management in compliance with the criteria, indicators and guidelines for the whole of Europe
- Improved legal regulations for protection of forests from air pollution
- Reduction of damage by game and ruminants to an ecologically acceptable level
- Measures for preservation and natural development of biodiversity
- Acceleration of research and development
- Close cooperation of forestry, industry and research for increased use of the renewable resource wood
- Increased use of renewable resources in the thermal insulation of buildings
- Increased use of wood for the erection of ecologically sustainable buildings of lasting value

As well as the implementation of country-specifically defined measures, also economic instruments are used to reach the specified reduction targets, in particular, the trade of emission rights. As well as "emission trading", flexible measures such as Clean Development Mechanism (CDM) projects, the purchase of emission reductions from Joint Implementation (JI) and Green Investment Schemes (GIS) are planned. Also in Austria JI CDM programmes will be implemented to contribute to reaching Austria's Kyoto targets.

02 GLOBAL DEVELOPMENT OF FORESTS

Worldwide forests cover a total of 4.03 billion hectares (ha) and make up 31% of the world's land surface. The distribution by continents shows that 53% of the world's forests belong to the 5 states of Russia, Brazil, Canada, USA and China.

Russia	809 million ha
Brazil	520 million ha
Canada	310 million ha
USA	304 million ha
China	207 million ha
Europe total – incl. Russia	995 million ha
EU member states	
incl. the rest of Europe – without Russia	186 million ha
Democratic Republic of the Congo	154 million ha
Indonesia	94 million ha
Sudan	70 million ha
India	68 million ha



Source: Food and Agriculture Organization (FAO) – Global Forest Resources Assessment 2010

Illustration 10 – Distribution of forests worldwide in million hectares (million ha)

Yearly changes in forests worldwide

In absolute figures and in percent of total amount, average from 1990 – 2000 and from 2000 – 2010

	Ø 1990-2000		Ø 2000-2010	
	in 1.000 ha	in %	in 1.000 ha	in %
Worldwide	-8.327	-0,2	-5.211	-0,1
South America	-4.213	-0,5	-3.997	-0,5
East and South Africa	-1.841	-0,6	-1.839	-0,7
West and Central Africa	-1.637	-0,5	-1.535	-0,5
North Africa	-590	-0,7	-41	-0,1
Oceania	-41	-0	-700	-0,4
Central America	-374	-1,6	-248	-1,2
Caribbean	53	0,87	50	0,75
North America	32	–	188	0,03
Europe incl. Russia	877	0,09	676	0,07
Europe without Russia	845	0,46	694	0,36
South and Southeast Asia	-2.428	-0,8	-677	-0,2
West and Central Asia	72	0,17	131	0,31
East Asia	1.762	0,81	2.781	1,16

Illustration 11 – Development of forests worldwide, 2000 – 2010

With a yearly loss of about 4 million hectares, South America is the continent with the highest deforestation worldwide, followed by Africa with 3.4 million hectares yearly. Oceania records a yearly decrease of 700,000 hectares, whereby the decrease there in the comparison period 1990 – 2000 was 200,000 ha/year higher. To about the same extent (700,000 ha/year) forest areas in Europe increased, Asia recorded a yearly increase of 2.2 million hectares, which can mainly be ascribed to China's reforestation projects.

2.1. EUROPEAN FOREST COVER

When talking about the entire European area, then Europe has nearly 1 million hectares of forests – i.e. 1.42 hectares and more than 2 football pitches per capita. Around 80% are in the Russian Federation. The European forests had an annual net growth rate of nearly 700 hectares in the time period 1990 – 2000, whereby the growth rate in Russia was only a low 52,000 ha/year.
In Europe coniferous forests prevail with 42% and mixed forests cover 40%. Only 18% are deciduous forests. 70% of the forests in Europe today can be attributed to systematic reforestation.

2.2. SUSTAINABLE FOREST MANAGEMENT

The UNO declared the year 2011 the "International Year of Forests" with the slogan "Forests for people".

All 192 UN member states have expressed themselves against deforestation of rainforests, which is responsible for the loss of biodiversity to an extent of up to 100 species a day. Furthermore, there is consensus concerning the extension of conservation areas and enforcing comprehensive and sustainable forest management.

Estimations by the World Bank show that the subsistence of more than 1.6 billion people worldwide depends on the use of forests. Internationally, tree, forest and wood products are traded at a height of 270 billion dollars. Resolution 61/193 International Year of Forests 2011 acknowledged in the 83rd plenary meeting on 20 December 2006, “that forests and a sustainable forest management could make a decisive contribution for sustainable development, for eradication of poverty and for reaching the internationally agreed development targets”.
According to further information from the World Bank, about 20% of global anthropological greenhouse gas emissions can be ascribed to deforestation. According to data from the FAO, there are more than 1 billion tonnes of carbon stored in the forests and forest floors worldwide – twice as much as in the atmosphere.

European forests are sustainable

After the Environmental Conference in Rio de Janeiro (1992), national and international guidelines and programmes were determined for forest management. More than 80% of European forests are already subject to these criteria. The official facility for sustainable management and protection of forests is the Ministerial Conference on the Protection of Forests in Europe – MCPFE, a cooperation formed in 1990 with headquarters in Norway, to which 46 European countries belong, and which concerns itself with urgent political and social questions on the topic of sustainability.

Certification and sustainability

In Europe certification of forests has been enforced relatively quickly, possibly due to the fact that already in 1992 there was a high standard of forest management.

35% of the certified forests worldwide are in Europe – and about 92% of those are in EU member states.

The European forest certification is mainly based on two initiatives – on the one hand the Programme for the Endorsement of Forest Certification – PEFC, which was originally developed for the prevailing forest structure in Europe, and on the other hand the Forest Stewardship Council® – FSC®, which was developed in cooperation with the WWF.

Certification according to PEFC and FSC

Wood and wood products have the advantage that, because of their natural origins, they may be classified as more environmentally-friendly from the start. Global warming has had the result that sustainable management of forests has become more important and the market demands proof of origin. Especially authorities, public building owners and also the procurement directives follow this trend.
Within the framework of PEFC and also FSC certification, independent certification facilities check the origin of the raw material as well as the function of the control system used in the company. On request, KLH® elements can be supplied PEFC/06-34-110 or FSC® C119602 certified.

With these certifications, we have the proof that our raw materials are obtained from sustainably-managed forests, that sourcing of the raw materials is internally monitored and that the criteria and conditions connected to external monitoring by third parties are fulfilled.

PEFC
PEFC/06-34-110
Promoting Sustainable Forest Management
www.pefc.org

FSC
www.fsc.org
FSC® C119602
The mark of responsible forestry

2.3. THE FOREST AS A CO_2 STORE

There are 2 possibilities for reducing CO_2 emissions – either by reducing CO_2 emissions or by increasing the "carbon sinks". The term "carbon sink" is used for any bound form of CO_2. With wood, both are possible.

The carbon cycle

In the carbon cycle, there are carbon sources on the one hand, and carbon sinks on the other. Carbon is continuously being exchanged between the two – the process involved is called the "carbon cycle".

Every year, due to the use of fossil fuels but also through other human intervention, 7,900 million tonnes (million t) of carbon are set free, carbon sinks absorb around 4,600 million tonnes of that – the remaining amount means a yearly increase of 3,300 million tonnes.

It is not possible to solve this problem by reducing the carbon sources alone – a simultaneous increase in carbon sinks is needed to balance things out.

Forests as carbon sinks

By means of photosynthesis a tree can absorb large amounts of CO_2 and store it in the wood – as a general rule-of-thumb, 1 m³ of wood can store between 0.9 and 1 tonne of CO_2. Austrian forests store approx. 800 million tonnes – this value corresponds to 40 times as much as the Austrian greenhouse gas emissions. In Austria significantly more wood grows than can be used – a forest inventory carried out a few years ago showed that there is a yearly growth of about 27 million m³, and the yearly use is about 20 million m³.

Forest areas in % land area in some EU states

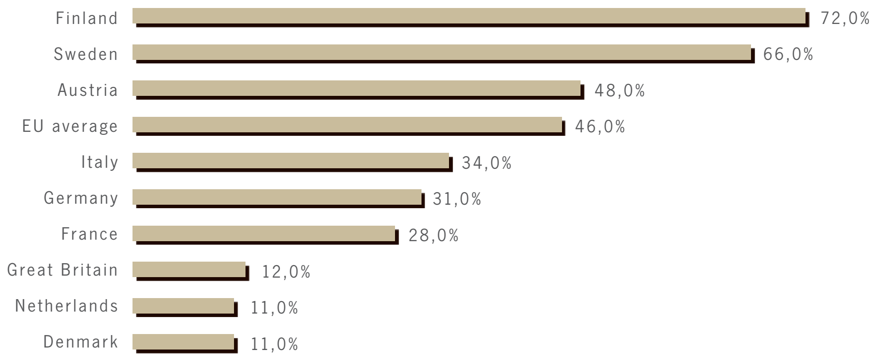


Illustration 12 – Forest areas in % land area – Source: FAO 2001, State of the world's forest

Forest area and the property situation in Austria

Forests in Austria are 80% privately owned and are very small in structure – more than half of the businesses have a forest area of < 200 hectares (ha). 15% of Austrian forests are state-owned, belonging to the Österreichische Bundesforste AG. The rest is distributed over communal forests, community and county-owned forests.

In Austria there grow primarily coniferous forests (70%) and mixed forests. The predominant type of tree is the European spruce with a percentage of 55% and which delivers the important raw materials for the production of our cross-laminated timber elements.

03 WOOD ACTIVELY CONTRIBUTES TO CLIMATE PROTECTION

The fact that the European forests are increasing by about 510,000 hectares every year and that only about 64% of the yearly growth is cut down, refutes the widely spread opinion that increased use of wood and wood products will lead to destruction of the forests. If you converted the European increase into m³, you would come up with an amount that is needed to build one wooden single family house every second.

If you consider that 30% of global CO_2 emissions and 40% of global use of resources are related to building, it is of immense importance that each cubic metre of wood that is used instead of another building material reduces the CO_2 emissions by an average of 1.1 tonnes of CO_2.

Add to these 1.1 tonnes of CO_2 reduction the 0.9 tonnes of CO_2 that are stored in the wood, then for every m³ of wood used for building a total of 2 tonnes of CO_2 are saved. Projected, this would mean that by increasing the wooden building percentage by just 10% in Europe already a quarter of the CO_2 reduction stipulated in the Kyoto Protocol could be attained.

In addition, it has to be taken into account that by using wood in buildings, over the period they are in use, significant energy can be saved – about 15 times more than with concrete and 400 times more than in comparable steel constructions.

Having said that, the attractiveness of wood as a building material will further increase and have a firm place in legislation and building regulations in the future.

3.1. WOOD IS MORE THAN JUST A RESOURCE

Wood is versatile

Wood accompanies us in all walks of life – as a raw material for the building, furniture and paper industry, as processed wood with almost unlimited possibilities, or for energy generation.

Many years of research and development work in cooperation with the wood processing industry have given the use of wood new dimensions that it did not have until now.

Wood creates employment

In the 25 EU member states, the wood processing industry alone creates around 3 million jobs and with a yearly turnover of approx. 2.3 million euros, contributes considerably to strengthening the competitive position of the EU. Around 290,000 people in Austria live from forests and wood, about 50,000 in carpentry and wood building companies, 23,500 in the wood industry and 18,400 in the paper and pulp industry.

Wood as an important economic factor

The entire industry is represented at European and international level by the European Wood Industry Association (CEI – Bois, Confédération Européenne des Industries du Bois) with headquarters in Brussels. The CEI – Bois encompasses national and European associations from 21 European countries.

CEI-Bois

The aim is to enforce use of wood in all sectors and to take advantage of the opportunities that new member countries bring with them.

Also in Austria the wood processing industry belongs to the fastest growing businesses.
With nearly 2.31 billion euros surplus in export, wood ranks in second place as an economic factor, after tourism. The export quota of all products produced in Austria is approx. 60%.

Our company produced about 74,000 m^3 of KLH® solid wood panels in 2012 and exported about 70% of them – in the next few years, we expect the amount produced as well as the amount exported to further increase.

3.2. WOOD AND WOODEN PRODUCTS REDUCE CO_2

The greatest opportunities for CO_2 reduction are in substituting building products with wood, as the energy used for production, transport and erecting of buildings using conventional materials is clearly higher than with wooden products and the use of different wooden constructions.

CO_2 reduction through use of wood is set out in Art. 3.4. of the Kyoto Protocol and makes it possible for industries that use wood in the EU and internationally to collect carbon points as part of the Carbon Credit Point Programme which they can then exchange for emission credits. Carbon credits are mostly bought by governments and businesses that have a moral and/or legal obligation to reduce CO_2 emissions.

Savings potential through more intensive use of wood

Substitution possibilities can especially be seen in the construction itself – which is why the replacement of classical solid constructions (brick, concrete, steel) by solid wood constructions shows the most savings potential, but also the use of wooden frame constructions, the use of corresponding insulation materials, in beams and columns, in wooden window frames and wooden floors.

According to a research study by Prof. Dr. A. Frühwald, at the University of Hamburg, between 12 – 30 tonnes of carbon can be stored in the structure and furnishings of a wooden house.

To find out the amount of carbon dioxide (CO_2) and carbon (C) stored in a wooden product it is assumed in general that there is a correlation between mass and CO_2 or C and that the amount stored can be calculated using a factor as follows:

Calculation of stored amount of CO_2:	Mass x factor 1.85
Calculation of stored amount of C:	Mass : factor 2

According to this calculation, the result would be the following examples but also a beginning for calculating the stored amounts of CO_2 or C in a wooden house:

Object examined	Wood mass in kg	CO_2 stored in kg	C stored in kg
Low-energy wooden house (solid wood panel)	43.935	79.083	21.968
Detached house (wooden frame construction)	20.000	37.020	10.000
Roof framework heavy (10.5 m^3 wood)	4.515	8.357	2.258
Roof framework light (4.6 m^3 wood)	2.000	3.670	1.000
Parquet (25 m^2 area)	125	231	63

Illustration 13 – Savings potential of wooden products

Source: Informationsdienst Holz (1997B)

According to this, a low-energy house built with KLH® solid wood panels stores around 79 tonnes of CO_2 – that is equivalent to the CO_2 emission of a car (1.4 l) over a distance of 360,000 kilometres, without taking into account the lower energy expenditure, or ten times the Austrian emissions per capita.

Wood saves energy and so further reduces CO_2 emissions

An energy conscious planning and use of buildings directly affect the level of running costs. Examinations have shown that in wooden buildings the room temperature is felt to be about 2°C higher than in conventional solid structures such as brick or concrete.

An important significance of energy-saving building includes the building insulation – with a low-energy house the annual heating demand lies between 40 – 50 kWh/m², with a passive house between 10 – 15 kWh/m² (according to Passivhaus-Institut Darmstadt or OIB, the Austrian Institute for Building Technology).

3.3. ADVANTAGES OF WOODEN BUILDINGS IN SOLID WOOD DESIGN

In conclusion of the previous statements, here is a summary of some of the advantages of wooden constructions in comparison with conventional brick and concrete constructions.

Wood is light

The study (Schnabel, 2002) of a residential complex with 36 units between 50 – 80 m² showed that the total weight of the wooden construction was less than half of a brick building – the advantages of which are, among others, the lower costs for the foundation, the lower transport costs and lower transport volume on the building site and the saving of energy in the production of the building materials.

Total weight of different construction methods in kg/m² of living area

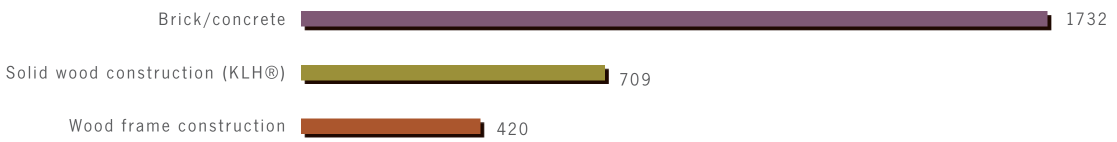


Illustration 14 – Total weight of different construction methods
Source: pro Holz Austria, Work booklet/Booklet 3/03

Wood is slim

Solid wood constructions of the same physical properties as conventional buildings made of brick or concrete are usually approx. 30% slimmer. That results in either an increase in the net useable floor space (approx. 10%) or if the net useable floor space is the same, a smaller requirement of land.

Wood is fast

Large-size KLH® solid wood elements prefabricated in weatherproof rooms allow for shorter assembly times (with a detached house an average of 1 day) and a quick completion of the building. The advantage of this lies in the saving of rent and the possibility of managing without expensive interim financing.

Wood stores CO_2

A wooden residential complex with 36 units binds between 500 – 700 tonnes of CO_2 over a lifespan of 75 years, depending on the wooden construction method, for one unit, therefore 14 – 21 tonnes of CO_2.

Carbon storage in multi-storey residential complexes in CO_2 kg/m² of living area

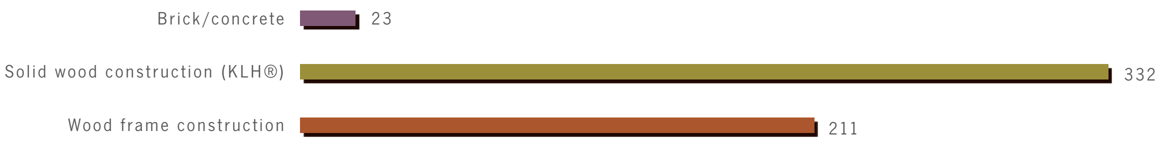


Illustration 15 – Carbon storage in multi-storey residential complexes
Source: pro Holz Austria, Work booklet/Booklet 3/03

Wood is reusable

At the end of an average lifespan of 75 years, the wood from the 36 units can be burnt. The useable thermal heat generated from this is more than 1 million kWh – applied to the entire living area (from 36 units) of 2,286 m² that is 500 kWh/m² – a thermal heating requirement that is enough for 5 years and that in this form is CO_2 neutral.

Comparison of wood frame and solid wood constructions (CO_2/residential building, 2,286 m² of living area)

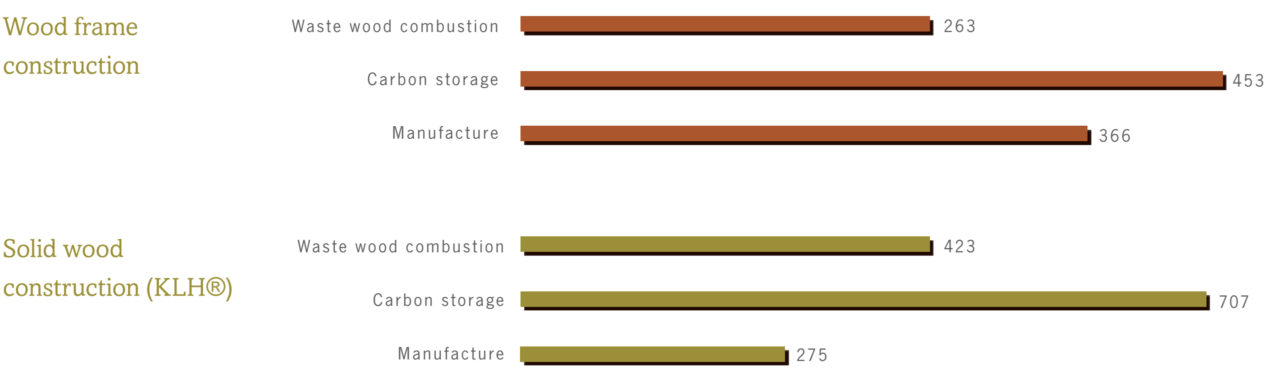


Illustration 16 – Comparison of wooden frameworks/solid wood constructions
Source: pro Holz Austria, Work booklet/Booklet 3/03

04 ECOLOGICAL ASSESSMENT OF WOOD AND WOOD PRODUCTS

Products from the forestry and timber industry not only contribute to an extension of carbon sinks, but to a high degree also to a reduction in carbon sources – for example through the use of wood products instead of fossil fuels.

If building materials are evaluated according to their CO_2 impact, essentially the following are taken into consideration:

- energy expended for the manufacture of the product
- possibility for energy saving during the period of use
- re-use and disposal of materials
- all processes before and after

4.1. LIFE CYCLE ANALYSIS (LCA)

Due to the importance of the topic, methods have been developed to, on the one hand, present the CO_2 footprint of buildings (Carbon Footprint) and, on the other hand, to assess the environmental burden during use and as a result of disposal. The most common method for recording a building's environmental impact throughout all phases is the LCA, often also known as ecobalance.

PRODUCTION (Phase 1) → USE (Phase 2) → END OF LIFE (Phase 3)

PRODUCTION (Phase 1)

Raw materials production
Raw materials procurement
Production
Cutting
Loading
Transport/building site

USE (Phase 2)

Energy consumption
Thermal properties
Maintenance

END OF LIFE (Phase 3)

Re-use
Recycling
Disposal

Illustration 17 – LCA – Life Cycle Analysis/Ecobalance

Production phase

In the first phase it is about the energy consumption from the procurement of raw materials to the transport to the building site. The energy expenditure for procurement and production of a building material is known as “grey energy” – the higher the amount of grey energy, the higher the CO_2 emission. Compared to other building materials such as steel or concrete, wood has a smaller percentage of grey energy and makes up the balance to CO_2 negatively. The reason for this is the carbon sinks in the forests.

A Swedish study compared the grey energy and the CO_2 emissions in the manufacture and construction of a house made of wood and a house made of steel/concrete – the difference between the wooden building and the classic construction of steel/concrete showed a value of 2,300 MJ/m², energy that would be enough to heat a house for about 6 years.

CO_2 emissions – comparison between the constructions in CO_2 kg/m²

Illustration 18 – Comparison of CO2 emissions between the constructions
Source: Dem Klimawandel entgegnen, www.cei-bois.org

Phase of use

Throughout Europe there are legal foundations and funding guidelines for increasing energy efficiency in buildings and for lowering energy expenditure. In this connection, not only is the construction decisive, but the facilities of the building in total – physical properties and the energy standard executed (e.g. low-energy, passive house) are just as important as the housing technology or use of renewable energies.

End-of-life phase

There is hardly another building material with the same or similar properties at the end of their lifespan, independent of whether wood is re-used, recycled or used for thermal energy.

Thermally used wood is effective as an alternative for fossil fuels, as a renewable source of energy, that only lets the amount of CO_2 into the atmosphere which it extracted and stored earlier.

4.2. ENVIRONMENTAL PRODUCT DECLARATION – EPD ACC. TO ISO 14025

This validated declaration is an environmental product declaration and describes the environmental performance of a building material. It applies exclusively to the product being examined and is limited to a 3 year validity period.

Content of an EPD (Environmental Product Declaration):

- Comprehensive product description and product information
- Information on raw materials and their origin
- Information on manufacture of the product
- Information on implementation and use
- Documentation of life cycle (LCA)
- Results of eco-assessment (life cycle inventory analysis)
- Certificate for measured data

International standards underlying an EPD:

- ISO 14025:2007 (set up of system, programme, PCR, verification)
- ISO 14040:2007 and ISO 14044:2007 (LCA – relevant for ecobalance)
- ISO 21930:2007 (sustainability of constructions and sustainability declaration of building product)
- CEN TC 350 (sustainability of constructive work)
- Processes and indicators at a European level (currently being implemented)

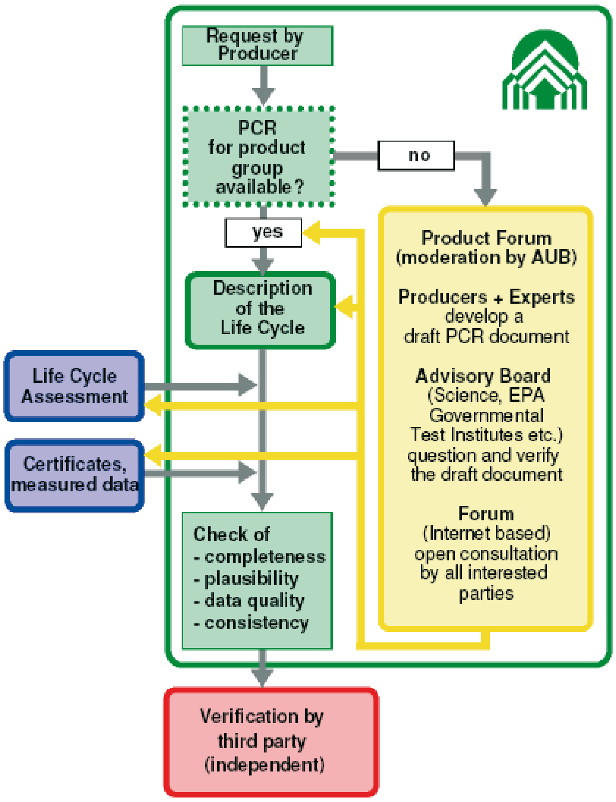


Illustration 19 – Process for an EPD
Source: PECEE GmbH

Environmental Product Declaration for KLH® solid wood panels

Because we are clearly committed to the protection of the environment and are proud that our product "KLH®" (cross-laminated timber) contributes significantly to the conservation of an inhabitable environment, we have not only embedded environmental thoughts in our mission statement, but we also intend to counter climate change with the use of wood. The EPD for KLH® solid wood panels can be downloaded at www.klh.at.

05 GLOSSARY

ALLOCATION
Method of distribution and allocation of material and energy flows – for example on the main and by-products of a production process.

ANTHROPOGENIC
Caused by humans/human activities.

AP
Acidification Potential, in kg CO_2 equivalent (acidification).

CO_2
Carbon dioxide.

CO_2 EQUIVALENT
Term for the effect of a greenhouse gas with the unit 1 t CO_2. Other greenhouse gases (methane, nitrous oxide, …) are calculated in CO_2 for reasons of comparability (equivalence factors).

DERIVED TIMBER PRODUCTS
Generic term for veneer boards, blockboards, chipboards and fibre boards.

ENERGY CONTENT
Is the amount of useable energy that can be gained by conversion of energy resources (coal, oil, wood, etc.).

EUTROPHICATION
Describes the enrichment of areas with nutrients, which causes a change in these areas and thus a change in the symbiotic community.

EXTRACTION OF RAW MATERIALS
Activities that have to do with the provision of raw materials. That includes exploration (e.g. oil exploration) and extraction (e.g. coal and ore mining). In the farming and forestry sectors that includes planting and harvesting.

FPY V20
Chipboard for load-bearing applications for use in dry areas.

FPY V100
Chipboard for load-bearing applications for use in wet areas.

GREENHOUSE EFFECT
The greenhouse effect of the atmosphere is in principle a natural phenomenon that is essential for the earth's climate. Due to anthropogenically-caused emissions, a non-controllable increase in the effect occurs and thus a dangerous change in the global climate.

GREENHOUSE GASES
Gases with strong absorption bands in the infrared (IR) light area, examples are water vapour and carbon dioxide.

GWP
Global Warming Potential, in kg CO_2 equivalent, term for the greenhouse potential.

HEATING VALUE
Describes the energy content of an energy source that can be utilised using available up-to-date technology.

IMPACT ASSESSMENT
The results from the inventory are assessed for their effect on the environment.

INDUSTRIAL WOOD OR PULPWOOD
Round timber with a small diameter (> 7 cm w/o. bark) as is usually used in the pulp and paper industry or wood composite industry. It is traded as industrial wood in short (1, 2 or 3 m) or long (tree length).

INVENTORY
Part of an ecobalance, which includes the compilation and quantitative registration of material and energy flows.

LCA
Life Cycle Assessment – also known as life cycle analysis, ecobalance and cradle-to-grave analysis.

MDF
Medium density fibre board. Made from wood fibres in dry production. The board has a high transverse tensile strength and tensile bending strength and an even density profile with a smooth surface on both sides.

MJ
Energy unit Mega-Joule (106 Joule) (1 kWh = 3.6 MJ)

MUF RESIN
Melamine-urea-formaldehyde resin. The condensation process proceeds analogously to that of urea resins through corresponding methylol compounds. In the heat these resins harden to limited boil-proof panels.

NATURAL FOREST MANAGEMENT
A forestry model that orientates itself on the natural, dynamic life processes of a forest. It comprises, among other things, small sized and selective care and use, largely refraining from using pesticides and with long time periods between treatments on one area (often many decades).

NP
Nutrification Potential, in kg PO4 equivalent, over-fertilization.

ODP
Ozone Depletion Potential, in kg R11 equivalent, stratospheric ozone depletion.

OSB
Oriented Structural (Strand) Board. An OSB is a board made of 3 layers of large size strands in specific orientations, whereas the strands of the outer layer are oriented approximately in the direction of the board, and the strands in the middle by contrast transversely.

PF RESIN
Phenol-formaldehyde resins are produced by condensation of phenol and formaldehyde in the alkaline pH range. Apart from pure phenol, also cresol, resorcinol and xylenol are condensed with formaldehyde. If precondensation is carried out in a strongly alkaline solution, the resin condensates remain water-soluble. Using phenol resins as a binding agent leads to a gluing of wood-based materials produced that is resistant to boiling.

PHOTOSYNTHESIS
This is the chemical process that takes place in the leaves and needles of green plants, by which energy from light causes glucose and oxygen to be synthesised from carbon dioxide and water, so organic matter is built up.

PMDI RESIN
Polymeric diphenylmethane diisocyanate. Unlike as with UF or PF resins, PMDI is not a precondensate that continues to polymerise and cures under the effect of heat, but it is mainly highly reactive monomers that continue to react during the course of the process and lead to strand-to-strand bonding with high water resistance.

POCP
Photochemical Ozone Creation Potential, in kg C_2H_4 equivalent, summer smog.

PRIMARY ENERGY
Also known as raw energy, it is the energy content of energy sources in its original form. In the ecobalance, the expenses needed for procurement, transformation and provision of the useful energy are calculated back to the amount of primary energy carriers needed for that.

RECYCLING
Return flow of re-useable products and materials from the same, similar or other products.

SUSTAINABILITY OF FOREST MANAGEMENT
Originally, the term sustainability comes from forestry and was only used concerning wood stocks: more wood may not be used than can grow back. In the meantime the term describes the striving for constant provision and optimisation of all forest functions in forest management for the good of the present and future generations.

The traditional term from forestry of sustainable management has been extended to all areas of life, especially since the Conference in Rio in 1992.

TOXICITY
Describes the toxicity for humans (humanotoxicity) or the environment (ecotoxicity).

TROPOSPHERE
Lower part of the atmosphere up to approx. 10 km in altitude.

UF RESIN
Urea-formaldehyde resins (urea formaldehyde) belong to the group of urea resins. Urea resins are obtained by the condensation of a watery solution of urea and formaldehyde. Cured urea resins are very hard and brittle, and they provide the chipboards with their excellent strength. In hot water, the adhesive bonds of urea resin glued chipboards are relatively quickly destroyed by hydrolysis. This board type is therefore not suitable for use in moist areas.

USE OF NATURAL AREAS
Impact category for assessment of size, quality and changes of the areas used.

WASTE
Every output from a product system that has to be disposed of.

WASTE WOOD
Wood that has already been processed and used in a product.

WOOD (ATRO)
Wood with a humidity of 0%, absolutely dry.

06 LIST OF ILLUSTRATIONS

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