

Holzwege 2020plus

Sustainable
future markets
for building
with wood



Project within the BMBF research programme
„Sustainable Forestry“

Developing Sustainable Markets for Building with Wood

Final Brochure

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www.holzwende2020.de

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1 CHALLENGES FOR THE FORESTRY AND TIMBER INDUSTRY AND FOR SUSTAINABLE BUILDING AND REFURBISHMENT

The challenges facing the forestry and timber industry and sustainable building with wood are the central focus of “Holzwende 2020plus”. This project is funded by the German Federal Ministry for Education and Research through the Jülich project management organisation. The project objective is to significantly step up the pace of the future development of sustainable markets for wood as a renewable material in the fields of new building and refurbishment of old buildings. The central starting point is targeted use of market development methods geared to sustainability goals. The core target is to improve the long-term competitiveness of the forestry and timber industry through new collaborations as well as customer and user integration.

What will be the nature of sustainable markets for wood as a building material in future? And how can they be developed in a target-oriented manner?

To answer these questions, four implementation projects were carried out:

- “Developing regional markets for new building with wood”,
- “Networks for refurbishment with wood”,
- “Material alliances for future markets” and
- “Virtual SME”

These implementation projects were chosen to cover a range of different markets and to involve different constellations of key actors.

The practical experience gained, the market development methods elaborated in the context of the “Holzwende 2020plus” project and the analyses of relevant trends are to be made available to other actors in the building and refurbishment sector as part of a broad transfer concept. This brochure is a central component of the transfer concept.

In the following, the brochure points out emerging trends in sustainable markets for wood as a building material and the forces that drive these markets. Different scenarios illustrate what the future could look like and what action is required.

The next section provides a concrete description of how sustainable markets for wood as a building material can be developed. Experience gained from the implementation projects is exemplified by some particularly interesting findings. These include the finding that the targeted use of market development methods is extremely important, and not only in the “Holzwende 2020plus” implementation projects. The methods presented centre around four objectives:

- To take improved account of customer and user needs,
- To reach central decision-makers with the customers,
- To network actors in the value chain (e. g. forestry, the timber industry, architects, building trades) effectively and
- To take target-oriented decisions in support of sustainable products and services.

CHAPTER 1



The brochure concludes with recommendations to politicians, business and society that are derived from the “Holzwende 2020plus” project.

The following research partners participated in the cross-disciplinary collaborative project, which was designed to run for three years:

- Wuppertal Institute for Climate, Environment, Energy (project coordination),
- Holzforschung München (HFM), Technical University of Munich,
- Institute for Future Studies and Technology Assessment (IZT), Berlin,
- Steinbeis-ForschungsInstitut Nachhaltige Rohstoffe (SFIN), Kleinmachnow,
- triple innova, Wuppertal.

Challenges for the forestry and timber industry and for sustainable building and refurbishment

The following were involved as industry partners in practical implementation, in the testing of research-based market development methods and in the transfer of project findings to a wider circle of users:

- Bundesarbeitskreis Altbaumerneuerung e.V., Berlin,
- CEBra – Centrum für Energietechnologie Brandenburg GmbH, Cottbus,
- LIGNOTREND Produktions GmbH, Weilheim-Bannholz,
- TECNARO GmbH, Ilsfeld-Auenstein.

The project website www.holzwende2020.de and a book publication (Kristof and Geibler, 2008) provide further information on contents and project partners.



2 SUSTAINABLE FUTURE MARKETS FOR CONSTRUCTION AND REFURBISHMENT WITH WOOD

The following section explores which emerging trends affect wood as a building material, which markets will be attractive in future, what sustainability actually means in construction and refurbishment with wood and which methods can be used to encourage the development of sustainable future markets. The answers to these questions form the basis for determining what action is required, for developing concrete approaches to opening up sustainable future markets, and for making recommendations to politicians, business and society.

2.1 What trends are emerging?

The significance of renewable resources, building and engineering materials is increasing. At the same time, there is growing competition between energy and material uses of renewable raw materials. Against this backdrop, emerging trends were analysed and potential sustainable future markets identified (Behrendt / Henseling / Erdmann / Knoll, 2007). Options for action by industry and politicians were also explored. The findings were used to elaborate scenarios for possible future developments (Erdmann, 2007). These scenarios complement existing forward-looking analyses (see for instance CEI-Bois, 2000; Knauf Consulting, 2004; United Nations, 2005; European Commission, 2005) and give politicians, business and other central actors a stronger basis for deciding how to develop sustainable future markets successfully and to usher in a long-term “timber turnaround” to 2020 and beyond, as suggested by the name “Holzwende 2020plus”.

The development of future markets for construction and refurbishment with wood will depend heavily on very different drivers and constraints. Drivers open up opportunities for the timber industry, especially in building with wood, and improve the chances of developing future markets. One of these drivers is the growing demand for timber and derived timber products abroad. Constraints slow the development of the timber industry and the wood-based construction industry, and in some cases impact negatively upon them. They include shortages in the supply of raw materials, reduced quality due to pests, vulnerability to storms, etc., resulting from new kinds of damage to forests. Drivers and constraints take effect on very varied time scales. Some trends, such as the shift to nature-oriented forest management or demographic developments, take a long time to develop their full impact, while others, such as the decline in new house building, are of short-term significance. Table 1 shows the central drivers and constraints and their prospective time scales.

CHAPTER 2

Table 1: Trends in future markets for construction and refurbishment with wood.

Source: Behrendt / Henseling / Erdmann / Knoll, 2007

Trend-categories	Relevant timescale			Trends / developments	Impact
	until 2010	2010–2020	after 2020		
Development in the building industry				Decline in new house building	–
				Increase in refurbishment	+
Structural change in the timber industry				Concentration processes continue	+/-
Income trend				Stagnating income development	–
Socio-demographic change				Ageing society	+/-
				Increase in number of households until 2017, followed by decrease	+/-
				Population decline from 2020	–
Change in lifestyles				Differentiation of lifestyles	+/-
				New target groups: LOHAS (Lifestyle of Health and Sustainability), senior citizens	+
Technological innovations				Chemical modification of wood; new areas of use	+
				Hybrid materials: Combination with other materials	+
				Greater emphasis on function and more system solutions	+
Globalisation of timber markets				Competition from Eastern Europe / Russia	–
				Increase in export demand	+
Availability of raw materials				Large unused timber stocks in Germany's forests	++
				Mobilisation constraints, especially in respect of small and very small private forests	--
				Raw material supply shortages	--
Competing uses				Rising demand for wood as energy source	–
Climate change				Rising temperature, increase in weather extremes (incl. storms)	–
Loss of quality due to calamities resulting from new kinds of damage to forests				Acid rain, pests, eutrophication, weather extremes	–
General political conditions				Policy on sustainable development	+
				Energy and climate policy	+
				Shift to nature-oriented forest management	+/-

+ : driver
 – : constraint
 +/- : positive and negative consequences for timber construction

Sustainable future markets for construction and refurbishment with wood

2.2 Where are the future markets for construction and refurbishment with wood?

Trends analysis reveals several starting points for developing markets for construction and refurbishment with wood:

- **Hybrid materials** combining wood with other materials and **new timber materials** produced using technologies from other areas offer great opportunities. A good example is the combining of materials made from renewable raw materials with plastics processing technologies to make ARBOFORM[®] building boards in the “Holzwende 2020plus” implementation project “Material Alliances”. New materials improve the competitiveness of timber products in many established fields of application and open up new application fields, including by enabling system solutions and new designs (see Wegener / Windeisen / Scholz / Schrader / Pfitzer / Nägele, 2006).
- The **market for refurbishment and modernisation** is growing and receives increasing backing from politicians with the aim of slowing climate change and saving resources (see Mantau, 2005; Luers, 2005). Approximately two thirds of the material and energy consumed in the building sector are used to construct buildings. Refurbishing rather than demolishing buildings and erecting new ones can cut material and energy consumption by up to 80 percent. That makes timber as a renewable material especially attractive for building in existing stock. Its strengths are especially evident in refurbishment as this lightweight material permits a high degree of prefabrication. This, in turn, keeps refurbishment periods short (see also BMBF, 2004; CEI-Bois, 2000; Holzabsatzfonds, 2002; Fornefeld / Tschurtschenthaler / Oefinger, 2004; Geibler / Kristof / Lippert / Neusel / Zink, 2007).
- To diminish land use and urban sprawl and to meet the needs of an ageing society (with older people moving back into towns to be closer to shopping facilities and medical practices, for example), planners will increasingly focus on the **redensification of cities**. The building material timber can profit from this, being very good for infill developments, multi-storey buildings and even for developing entire neighbourhoods (Eimertenbrink / Fichter, 2006). The potential for topping up existing buildings is especially good, since a high degree of prefabrication can reduce costs and shorten construction times, which in turn keeps to a minimum the period during which the living or working conditions of occupiers are impaired.
- **Market segments oriented on new target groups**, such as “transient homes” for people who do not want to build a “house for life” are another important emerging market. Yet at present the timber industry and timber building sector are still very much focused on the raw material timber and its technical properties, and pay too little attention to the requirements and needs of customers and users. To market timber products successfully, they must focus much more on what customers want. Actively involving customers in product development or in the planning of building and refurbishment projects will facilitate the development of customised, target-group-specific solutions (e. g. for the 50+ generation, the “generation of heirs” or ecologically motivated milieus) and help position them successfully in the market (also see Mantau, 2002).

- **System solutions** and modular products modelled on industrial construction methods make it possible to adapt to individual target groups and to produce low-cost, ecologically beneficial solutions. In combination with **all-inclusive packages**, they make building and refurbishment considerably easier for private developers, the housing sector and public authorities (Bierter / Clausen / Fichter, 2006).
- **Foreign markets** for wood-based building and refurbishment are increasingly attractive, and rising demand from the United States, Asia, Russia and Eastern Europe is opening up export opportunities. At the same time, it is important to keep track of growing competition from products from Eastern Europe, Russia and other GUS states (successors to the former Soviet Union). It is therefore necessary to develop products adapted to export markets. In doing so, the expertise of German suppliers should be utilised systematically as a competitive advantage (Behrendt / Henseling / Erdmann / Knoll, 2007).
- Growing competition between use of wood as material base and as an energy source makes system solutions for **cascade uses** especially interesting. They could include, for example, design solutions that are easily dismantled, upcycling (e. g. turning plastic bottles into fleece tops) and downcycling (e. g. making paperboard containers from wooden components), simple options for reuse and recycling, and **services centred on secondary raw materials** such as raw material exchanges or eco-industrial estates.

2.3 What will a sustainable supply look like in these future markets?

Companies will only achieve long-term success in construction and refurbishment with wood by producing in a sustainable way and providing sustainable products and services. Consequently, the next question is: What will a sustainable supply look like in these future markets?

The target-indicator system developed in the “Holzwende 2020plus” project provides an answer. Developed specially for the sustainable construction and refurbishment with wood value chain (Kristof / Schmitt / Villar / Geibler / Lippert, 2006; Kristof / Schmitt, 2007), it was based on previously published cross-cutting studies (such as CSD, 2001; OECD, 2004; Ankele / Buchert / Ebinger / Fürst / Jenseit / Schmitz / Steinfeldt / Schultz / Stieß / Hentschke, 2001; BMVBW, 2001; Buchert, 2001; BMBF, 2002; MCPFE, 2003) and on expert interviews.

Table 2 shows the targets identified for the value chain of construction and refurbishment with wood as well as relevant indicators for measuring results. These indicators can support actors in politics and society in designing markets and their underlying conditions. In the public debate and in market development, only concrete, measurable goals and indicators are useful for informed decision-making. The target-indicator system for the political level therefore focuses on result and status indicators. At individual company level, it is helpful to have additional process indicators. These merely record the existence of, for example, environmental management systems or employee training, since for companies the impact of such systems and activities cannot be measured at reasonable cost.

Sustainable future markets for construction and refurbishment with wood

Targets	Indicators
Targets and indicators for individual stages of the value chain	
1. Forestry	
Sustainable forest management	Forest management with externally certified sustainability management
Efficient development of marketing potential	Needs-based provision of high-quality timber for the construction sector
2. Industrial and craft timber processing and working	
Processing and working of regional / certified timber products	Proportion of regionally produced timber used
	Proportion of certified timber used
Benchmarking / product labelling	Proportion of timber building materials produced with a sustainability label / quality mark
Cascading uses	Proportion of recyclable timber building materials produced
3. Sustainable construction and refurbishment with wood	
Use of sustainable timber products	Proportion of regionally produced timber building materials
	Proportion of certified timber building materials
	Use of recyclable and reusable (timber) building materials
4. Building use	
Enhancement of quality of living conditions and safety	Quality of living conditions (ambient air, noise emissions, etc.)
	Safety (toxicity in case of fire, long-term structural load capacity, etc.)
Cost-efficiency in the operating phase	Running, maintenance and service costs
	Durability and refurbishment intervals
5. Sustainable disposal of used building materials	
Sustainable end-of-life management	Monitored use of non-recyclable used wood for energy purposes
	Environmentally friendly disposal of used wood that is not viable as an energy source or as a raw material
Targets and indicators across the value chain	
Sustainable corporate management	Reduction in material, energy and water consumption
	Proportion of renewable energies and renewable raw materials used
	Decrease in emissions and pollution
Action in the value chain (incl. trade and logistics)	Reduction and optimisation of transport requirements
Competitiveness and innovation	Creation and securing of local jobs

Table 2:
Target-indicator system for the value chain construction and refurbishment with wood at the level of political and social actors designing markets and their general conditions.

Source: Kristof / Schmitt / Villar / Geibler / Lippert, 2006

The target-indicator system contains both targets and indicators designed for individual stages of the value chain and goals and indicators that apply equally to all stages of the value chain.

2.4 What methods can be used to develop sustainable future markets?

Sustainable future markets must be developed systematically. The decision-making processes required can be supported by a range of methods that can be applied both separately and in combination. In each case, these methods must be adapted to market segments, providers, their customers and the market phase (innovation, market launch and wide diffusion). Researchers in the “Holzwende 2020plus” project developed and improved methods and online tools for market development that were then applied in implementation projects. Concrete use of these methods soon convinced the industrial partners that systematic use of such methods is advantageous for businesses and leads to tangible results.

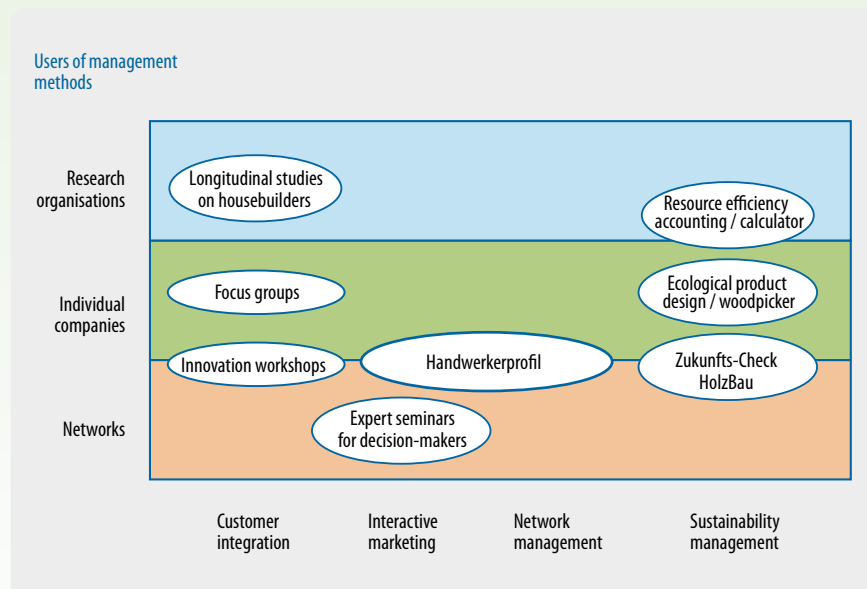
Figure 1 gives an overview of the methods applied. A distinction is drawn between four types of method, as follows:

- Methods that promote customer and user integration
- Methods of interactive marketing
- Network management methods and
- Methods that ensure the sustainability of product design, production, products and services.

The targeted user groups are also very diverse. Some methods are of particular interest to individual companies, others to business networks. In some cases, companies should apply methods

Figure 1:
Methods for developing sustainable future markets.

Source: www.holzwende2020.de/learnplattform



Sustainable future markets for construction and refurbishment with wood

only in conjunction with research institutions, industry associations, etc., as they require specific expertise that companies do not always have available or that is not part of the companies' core business.

To ensure that the use of these market development methods can continue beyond the "Holzwende 2020plus" project, a learning platform was developed which presents the methods and a variety of Internet tools (access via www.holzwende2020.de/lernplattform). In parallel to this, a research paper was published for discussion (Fichter / Bierter / Behrendt / Geibler / Henseling / Kaiser / Kristof / Wallbaum, 2007; download at www.holzwende2020.de). The central finding is that effective methods are essential for developing future markets for construction and refurbishment with wood and that in implementation these methods must be combined and adapted to the specific situation and target group.

2.5 Scenarios: What shape could the future take?

Emerging trends, sustainable future markets identified and options explored for action by business and politicians form the basis for scenarios of possible future developments. They highlight possible developments that can be partly shaped by business and politicians. Though some trends cannot be influenced by companies or politicians, scenarios of this kind will enable politicians, business and other central actors to shape the "timber turnaround" successfully (Erdmann, 2007).

Four scenarios highlight in compressed form the possible problem areas for the forestry and timber sector. However, they should not be taken as prognoses, nor do they lay any claim to completeness. Building on possible trends, they outline plausible pictures of the future and its challenges, to which the forestry and timber sector must respond at an early stage. Figure 2 gives an overview of the key points in these four scenarios.

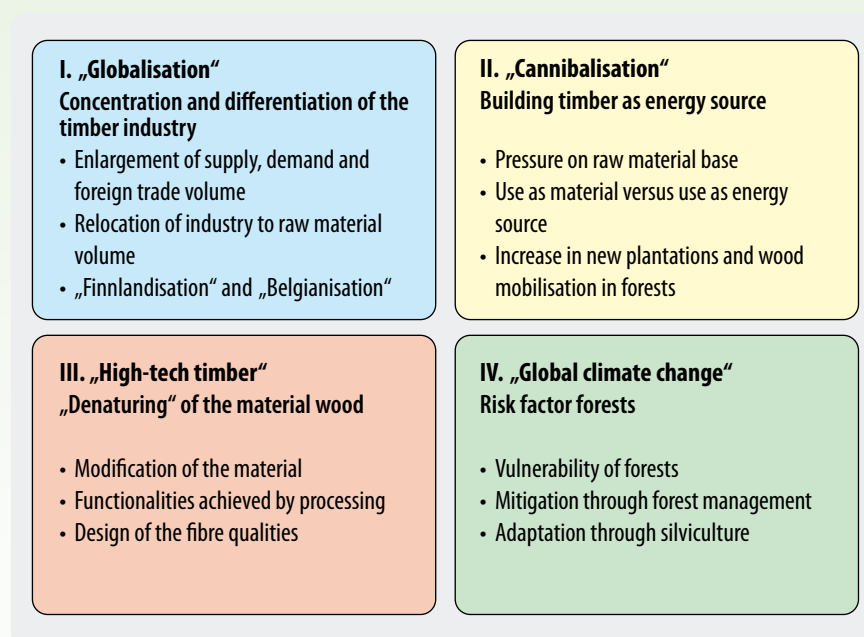


Figure 2:
Overview of four scenarios – framework for achieving a “timber turnaround” to 2020 and beyond.

Source: Erdmann, 2007



3 NEED FOR ACTION

The central challenges in developing sustainable future markets for construction and refurbishment with wood are to establish sustainable development and to solve problems resulting from the shortage of resources and growing competition between different uses.

3.1 Sustainability

Sustainability is a widely discussed topic, both in the construction and refurbishment sector and in the forestry and timber industry (see for example BMBF, 2004; Buchert, 2001; Bundesamt für Bauwesen und Raumordnung, 2001; Frühwald / Pohlmann, 2002; Rat für Nachhaltige Entwicklung, 2004; Bundesregierung, 2005; BMVEL, 2004; Türk / Münzing / Wallbaum, 2007; Kristof / Schmitt / Villar / Geibler / Lippert, 2006). Yet the implementation of sustainability goals lags far behind expectations. Three examples will illustrate this in brief.

There is an enormous backlog in the energy-efficient refurbishment of residential and non-residential buildings. The public subsidy programmes set up for this purpose, such as the KfW banking group's "Housing Modernisation" programme, reach only a small proportion of the target group. As yet, only around one in four modernisations has included energy-efficiency measures. Even new building projects often fail to meet the requirements laid down in the German Energy Saving Regulation (EnEV) because implementation of the planned energy efficiency measures is inadequately monitored. As a result, energy consumption, the associated greenhouse gas, nitric oxide and other toxic emissions, and heating costs, are still unnecessarily high, to the detriment of owners and tenants, the environment and future generations.

At present, hardly any public discussion takes place on the topic of material-efficient building. Even committed planners, architects and public and private builders who are highly aware of the problems hardly ever design or build material-efficient buildings. After all, they currently derive little direct benefit from doing so, and clients and tenants only occasionally call for action.

Few customers are familiar with sustainability certificates for timber or, above all, for timber products (FSC, 2004; PEFC, undated; natureplus, 2007). They often mix up different labels. This means that certificates and labels play only a minor role in the market and that hardly any purchase decision is guided by high-quality labels (Burger / Hess / Lang, 2005).

Therefore, sustainability goals can only be raised from the "wish level" to the "concrete implementation level" if politicians, business and society continue to work together to develop effective strategies. Construction and refurbishment with wood could play an important role here. Given the scarcity of resources and the aim to prevent climate change and reduce the volume of waste, national and EU energy, climate and resource policies must also be integrated systematically into the building and housing sectors.



3.2 Shortages and competing uses: Timber mobilisation and cascading uses

The trend towards using timber as energy source has already affected the price trend for industrial timbers and will continue to have a noticeable impact on the pricing of sawable woods (Knoll / Rupp, 2007; Verband der Deutschen Holzwerkstoffindustrie, 2006). As competition between uses intensifies and shortages in the supply of raw material loom, mobilisation of timber stocks that have not yet been commercially exploited will play an important role (Behrendt, Rupp, 2006; Verband der Deutschen Holzwerkstoffindustrie, 2006). In parallel to this, competition between

uses should be reduced, for example by means of cascading use concepts (Bringezu / Ramesohl / Arnold / Fishedick / Geibler / Liedtke / Schütz 2007). In other words, timber should first pass through as many stages as possible of use as a material (e. g. first in various wooden components, then as paper) and should only be used for energy if it is no longer usable as a material.

Timber mobilisation, that is, increased use of regenerating wood masses, remains a Herculean task that politicians and the forestry and timber industry can only perform together. New concepts must be developed, above all for small private forests, and must be implemented within the framework of wood clusters that network all relevant actors (Mrosek / Schulte, 2004; Mrosek / Tesch / Kies / Schulte, 2005; Holz Cluster Niederösterreich, 2004; Cluster Forst und Holz in Bayern, 2007).

Along with timber mobilisation, the main instrument for reducing competition between uses is cascading use, whereby wood is first used as a material in as many forms as possible and only in the last instance for energy. This is also an important step towards sustainability. Effective resource management that pays attention to climate aspects as well as resource scarcities will rely on a strategy of using timber as material of the highest possible quality rather than burning it directly. In this way carbon will be absorbed enduringly in wood products and wood can replace non-renewable raw materials. Many authors have stressed that cascading use makes sense (e. g. Frühwald / Welling / Scharai-Rad, 2003; Lippke / Wilson / Perez-Garcia / Bowyer / Meil, 2004; Pohlmann, 2002; FTP National Support Group Germany, 2007). However, how this is actually to be implemented remains unclear in many areas. Research, analysis of successful and unsuccessful practical examples, concepts for different renewable raw materials and categories of goods, pilot projects and market launch programmes can all help to implement widespread cascading use.

It is necessary to investigate whether from the viewpoint of sustainable development it makes sense to extract more timber than hitherto, for example from short-rotation plantations that are felled at short intervals (see Fachhochschule Eberswalde, 2007; Große, 2006). An informed decision in favour of sustainable land use will only be possible if all land-use options are studied together, from the production of food and renewable raw materials via housing, commerce and transportation to leisure and nature conservation. This must also include international impacts, since our way of production and consumption has consequences abroad.



Photo: Kaden + Klingbeil Architekten

4 CENTRAL APPROACHES TO ACTION

Against this background, a number of examples will serve to illustrate how the development of sustainable markets for wood as a building material can be implemented and supported. The experience of the implementation projects is represented by individual, particularly interesting findings. In parallel, the market development methods employed will be described.

4.1 Structural change, innovations and new system solutions

Timber markets, including construction and refurbishment with wood, are currently developing very dynamically. The field of tension lies between globalisation tendencies and the compulsion to adapt to the world market on the one hand and the renaissance of regionalisation on the other. Moreover, competition on the world market is intensifying and international trade is growing strongly. In situations like this, new products and new system solutions offer decisive competitive advantages. It is therefore increasingly important to realise innovation potentials (see De Man / Bierter, 2001; Deppe, 2005; Arnold / Ankele, 2006).

Important starting points for facing up to these market challenges are technical innovations (such as building panels made from the thermoplastic material ARBOFORM®) on the one hand and, on the other, the systematic development of future markets that offer sustainability potential, are growing strongly and are of interest for timber as a building material (e. g. for multi-storey wooden buildings in cities or refurbishment with wood).

4.1.1 Material alliances for future markets: ARBOFORM® building board

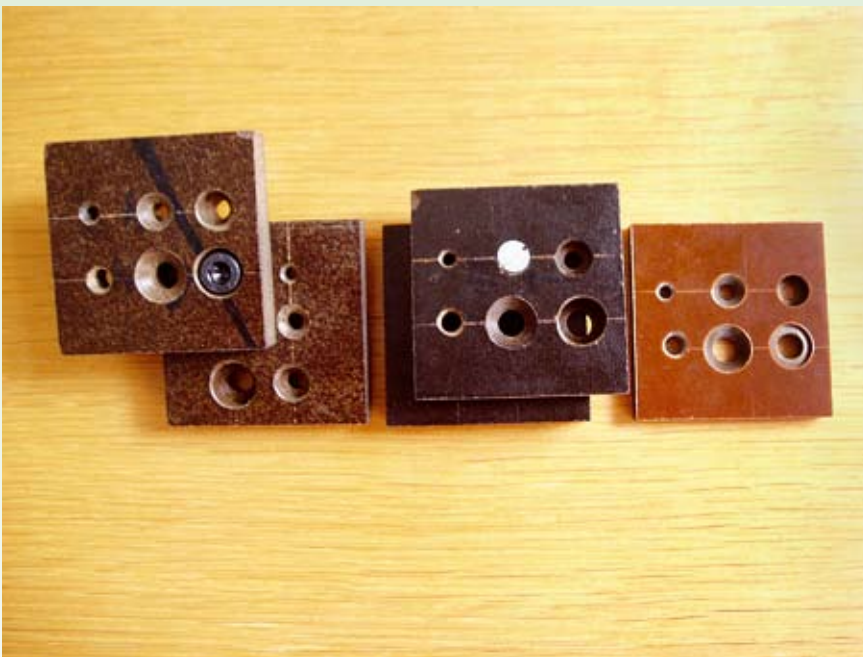
In the 1980s and 1990s, a quantum leap with regard to technology in the field of traditional timber materials conquered mass markets with fibreboard, chipboard and OSB. Now, signs of a second quantum advance in technology are emerging as use of hybrid materials is increasing. Moreover, new material alliances combine renewable raw materials with technologies from other areas of processing, such as the plastics industry. Funding and transfer of research and targeted support for market launch are important if this new wave of innovation is to remain internationally competitive. Smaller companies in particular must be given targeted support at the interface between the development of new products and the market launch of those products. Such enterprises often lack market development methods. They also face other socio-economic obstacles (see FTP National Support Group Germany, 2007). They often have difficulty in safeguarding their know-how, not just by patents, but because, for example, they have no strategies for preventing large companies from poaching key employees.

In the “Holzwende 2020plus” implementation project “Material Alliances for Future Markets”, the Holzforschung München at the Technical University of Munich investigated the opportunities for new products of this kind. The project started out with the idea of using technologies from the



Figure 3:
Surfaces and workability
of ARBOFORM®
construction boards.

Source: Holzforschung
München at the Technical
University of Munich (TUM)



plastics industry to make construction boards from the thermoplastic material ARBOFORM[®]. This product of TECNARO GmbH is made entirely from renewable raw materials (wood, fibres, lignin, additives). The project also sheds light on the extent to which new markets develop on the basis of renewable raw materials.

Researchers were able to demonstrate that the material properties of ARBOFORM[®] are suitable for making construction boards (Wegener / Windeisen / Scholz / Schrader / Pfitzer / Nägele, 2006). Various prototypes were produced on the basis of different starting mixtures. The board dimensions varied during the course of the project, ranging from laboratory scale (200 x 160 x 8 mm) to industrially manufactured formats (2,000 x 1,000 x 13 mm). The boards have a number of favourable properties. Their moisture content is only around 8 percent. Also, they expand very little compared with conventional wooden materials, by just around 1 percent. At approximately 0.1 W/(K·m), their heat conductivity is within the range of insulating materials, which is remarkable for a high-density building material. Their density of roughly 1,250 kg/m³ gives them good compressive strength (61 N/mm²) and hardness (160 N/mm), superior to that of wood, timber materials and customary plastics. Their deformation rigidity is also very high, at around 5,500 N/mm². The material is easy to saw and plane, and the boards are easy to screw. Bore holes and threads can be easily introduced (see Figure 3, right). The surface of the boards can be finished by painting, or by applying wood veneers, decorative laminates or foils (see Figure 3 left). After use, untreated ARBOFORM[®] products can be used for energy purposes without any problems.

A key challenge for ongoing development will be to optimise the composition of ARBOFORM[®] (fibres, lignin, additives) by varying the starting components in order to achieve different properties for specific areas of use.

4.1.2 Using timber for multi-storey buildings in cities

Nearly half of humanity now lives in cities. Multi-storey wooden buildings in city centres open up new possibilities for innovative building solutions and make urban living more sustainable. As yet, however, hardly any wooden buildings more than three storeys high have been realised. Yet the general situation as regards statics and fire protection has changed fundamentally over the past two decades. Outstanding technical and design possibilities now exist, for example using solid timber construction. Even fire safety experts have certified that wooden buildings are at least as safe as stone and steel constructions. This is increasingly reflected in approval proceedings. In Berlin, for example, approval was given for a six-storey residential care home in solid timber construction that was also awarded the 2006 German Fire Safety Prize (see Figure 4).



Figure 4: Six-storey residential care home in solid timber construction in Berlin-Lichtenberg (scheduled for realisation in 2008).
Source: Kerbl Architekten, www.kerbl-architekten.de



Figure 5: Seven-storey wooden apartment block in Berlin-Pankow (completion 2008).
Source: Kaden + Klingbeil Architekten, www.kaden-klingbeil.de

Also in Berlin, a seven-storey apartment block of solid timber construction will be completed in 2008 (see Figure 5).

The “Holzwende 2020plus” implementation project “CityHolz” developed and tested innovative information and communication measures designed to address different target groups. The aim was to close existing gaps in knowledge about multi-storey building in wood and to dispel prejudices. Among other things, researchers developed the concept of the expert seminars for decision-makers. The seminars are aimed at relevant decision-makers in a specific building segment, such as homes for the elderly and care homes. Systematic pre-examination of decision criteria and the existing prejudices of decision-makers in this field (e. g. care home operators, relatives of people in need of care, investors, bankers, etc.) makes it possible to elaborate a target-group-specific seminar agenda and to highlight suitable practical examples (Bierter / Clausen / Fichter, 2006; Eimertenbrink / Fichter, 2006).

4.2 A map of the market and its products: The NABAHO system components catalogue

Many customers, such as private households or public property developers, business customers and housing societies, but also many architects and planners, tradesmen and system solution providers have difficulty in finding their way around the multitude of different products for construction and refurbishment with wood. Innovative sustainable system solutions have a particularly difficult stand because they have scarcely been launched on the market. Consequently, the sustainable future market for construction and refurbishment with wood has been slow to take off.

Good information on components and system solutions, along with reliable, verifiable quality criteria for product selection, can simplify market orientation. Moreover, they make it possible to compare different offers, thereby reducing information deficits.

System solutions must be sustainable and must optimally fulfil their function. Only if they do so will timber buildings and their components have enduring use.

The “Holzwende 2020plus” project therefore proposes the development of a NABAHO (NACHhaltiges BAuen mit HOLz, or sustainable building with wood) system components catalogue. The idea is to present new timber construction system elements (ceiling, wall, roof or acoustic elements) launched on the market in an open-access online information system, provided that they fulfil verifiable sustainability criteria. This information will be prepared to cater for specific user and target groups so that it can be found quickly and efficiently. It will also be possible to compare the sustainability impact of individual offers.

The aim of the NABAHO system components catalogue is to reinforce planning reliability in timber construction, especially for architects' and planning offices, and to reduce planning costs. It is also intended to prompt innovations in timber system components and to offer an advertising platform for the timber industry. Since the system components catalogue is to include only sustainable, high-quality, user-friendly solutions, it will also enhance the image of timber as a building material. This will make it possible to convince investors and financiers (private customers, business customers, public clients, bankers) that wood can be used for user-friendly buildings and refurbishments that hold their value.

The NABAHO system components catalogue is to be drawn up jointly by the Steinbeis-ForschungsInstitut Nachwachsende Rohstoffe, the German Society for Wood Research e.V. (DGfH), the Holzforschung München at the Technical University of Munich, the Institut für angewandte Technologien im Holzbau at Rosenheim University of Applied Sciences, LIGNOTREND Produktions GmbH and other system suppliers.

4.3 Customer orientation and integration

Customer orientation and integration are important factors for a successful development of sustainable future markets, as studies and experience from the “Holzwende 2020plus” project have shown (e. g. Fichter, 2005; Fichter / Paech / Pfriem, 2005; Compagnon Marktforschung, 2002; Holzabsatzfonds, 2005; Henseling, 2007; Arnold / Ankele, 2006). Companies, company networks and multipliers such as the German Timber Promotion Fund or industry associations should intensify activities aimed at improving customer orientation and develop instruments for implementation. The “Holzwende 2020plus” project will help by elaborating a variety of user-friendly market development methods via an online learning platform, Internet tools and publications.

To achieve customer orientation and integration, it is important to get to know customers, their needs, motivations and problems. Here, longitudinal studies on housebuilders supply information as to why housebuilders use or decline to use timber construction.

Customers also want to know something about suppliers and to draw comparisons between them. The experience of other customers, whether they be housebuilders or others involved in the building process, such as architects, is of particular interest. The “Holzwende 2020plus” project therefore developed an online assessment tool to post customers’ and architects’ ratings of the building firms involved in specific construction projects. These ratings will be shown side by side with the firms’ self-assessment.

4.3.1 Longitudinal studies on housebuilders

The aim of the longitudinal studies on housebuilders carried out by the “Holzwende 2020plus” project was to analyse

- clients’ wishes, needs and preferences,
- the advantages and disadvantages of timber construction from the clients’ point of view,
- satisfaction with the building process and collaboration with the firms involved.

Following up previous studies (e. g. Compagnon Marktforschung, 2002), twelve house-building families from Berlin and Brandenburg were accompanied for several months of the building process. The Institute for Future Studies and Technology Assessment (IZT) interviewed the house-building families based on interview guidelines from the start of information procurement through the decision phase and the house-building phase until they were living in their new homes.

Figure 6 shows the customer requirements and how small and medium-sized timber building firms and architects can respond to them.

Findings from the longitudinal studies were discussed at an expert workshop. Subsequently the findings were used to develop a guidebook (see Henseling, 2007) that provides specific suggestions for improving customer orientation and marketing in timber construction for single-family and two-family homes.

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Customer requirements	<ul style="list-style-type: none"> To receive broad-based information To exchange information with other clients To be able to experience the house for themselves 	<ul style="list-style-type: none"> To realise the dream of having their "own four walls" To implement their own ideas A competent firm that makes this possible Recommendations from friends, relatives A firm with good references (from other clients) To be able to experience the house for themselves (viewing, trial occupation, etc.) A firm they feel they can trust 	<ul style="list-style-type: none"> Good standard of work Involvement in decision-making Flexibility to make subsequent changes To be informed of progress Smooth flow of project Adherence to time schedule/ building process successfully planned Adherence to budget plan 	<ul style="list-style-type: none"> To see their ideas implemented That others like it That refinishing should be done promptly Opportunities for feedback
	Action	<p>Information phase</p> <ul style="list-style-type: none"> Wide use of information channels for marketing Create offers to experience the house: show houses, trial occupation, site visits, open days, etc.) Use the Internet 	<p>Decision phase</p> <ul style="list-style-type: none"> Develop recommendation marketing Create reference objects / show homes to "experience for yourself" Respond to clients' individual wishes and ideas React to enquiries promptly and professionally Good care-taking of customer from the beginning 	<p>Building phase</p> <ul style="list-style-type: none"> High-quality work See clients as partners Respond to individual wishes even during the building phase Good site supervision, good management Smooth cooperation with participating firms Good communication with client Good problem resolution management

Figure 6:
Customer requirements and how companies can respond to them.
 Source: Henseling, 2007

4.3.2 Handwerkerprofil: Internet-based customer integration and marketing

Planners, architects and public and private housebuilders need to find suitable and reliable building firms and tradespeople. Often, clients lack the relevant information and have to spend a great deal of time and money on looking for suitable firms and comparing their performances. The failure to do so often results in poor-quality building. Unsurprisingly, confidence in the quality of building firms' and tradespeople's work may suffer in consequence.

Most companies in the timber construction sector have identified their lack of customer orientation and marketing deficits as weaknesses. But it is difficult for smaller building firms in particular to inform their customers of the range of services they offer and of their specific strengths. Thus they depend on cooperation arrangements and networks to survive in competition with larger companies. Sensibly organised cooperation can compensate for potential customers' shortage of information, produce synergy effects, prompt and accelerate development and innovation processes and boost marketing and sales opportunities (Geibler / Kristof / Lippert / Neusel / Zink, 2007; Geibler / Lippert / Zink / Kristof, 2007). The parties who are typically involved in building projects – housebuilders, planners and architects, building firms and the various trades – must therefore be brought together.

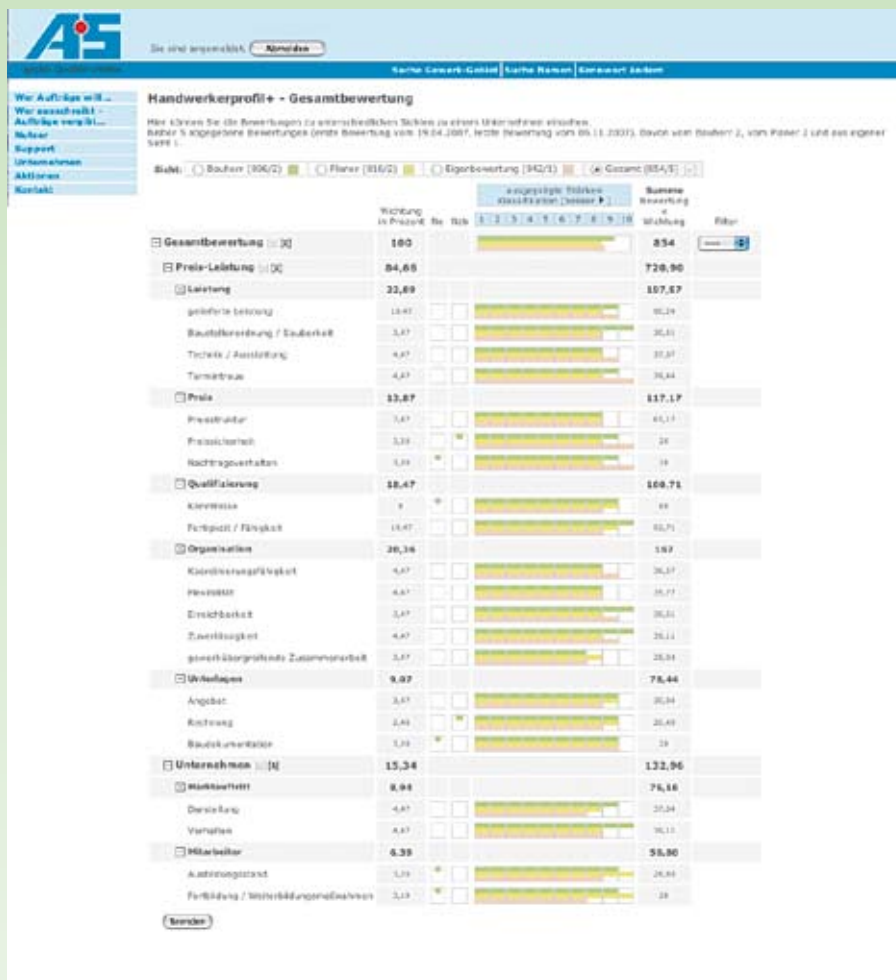


Figure 7:
Handwerkerprofil
with ratings from
three points of
view: housebuilders
(green), planners and
architects (yellow) and
self-assessment (red).
 Source: AS
 Architekten-Service

Within the framework of a “Holzwende 2020plus” implementation project, the Bundesarbeitskreis Altbauerneuerung e. V. (BAKA), AS Architekten-Service GmbH and the Wuppertal Institute therefore developed an online assessment tool called ”Handwerkerprofil”. All key information about building firms and tradespeople is provided there, offering reliable information about the quality of their work. The Handwerkerprofil is designed for use by anyone involved in building: building firms, planners and architects and housebuilders (see also Geibler / Bienge / Henseling / Bottin / Woike / Zink, 2007; Lippert / Stenzel / Geibler, 2007).

The Handwerkerprofil is based on consistent, practical and sustainability-oriented criteria for building firms that work in timber construction. The assessment criteria reflect central aspects of the performance profile of such firms. The online assessment tool enables quick, easy and inexpensive comparisons between the building quality of different firms in the timber construction industry. It permits direct comparison between the housebuilders’ and planners’ and architects’ assessments and building firms’ self-assessments (see Figure 7). Numerous performance factors, from competence and keeping appointments to technical equipment and employee training are rated and awarded marks from 1 to 10, 10 being the highest. Users can also choose between a fast general rating and a detailed assessment process.

The Handwerkerprofil has advantages for everyone involved in building – architects and planners as well as housebuilders can use it to select suitable timber building firms and other building firms

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quickly and systematically. Building firms can utilise the platform for marketing and the ratings to improve their performance, for example by optimising quality assurance, encouraging employee training and in-house learning processes, expanding their offering or specialising.

Thus the Handwerkerprofil will improve the future opportunities of capable building firms and facilitate speedier, high-quality processing of building projects, thereby increasing building quality, the satisfaction of architects and planners as well as housebuilders and the image of building firms in general.

4.4 Networking in the value chain

Along with customer orientation, the networking of actors in the wood-based construction and refurbishment value chain is a further crucial factor if companies are to develop sustainable future markets successfully.

Building firms and other small and medium-sized enterprises often concentrate on their core business to such an extent that they neglect the importance of networks. Only when they realise the network's importance to them and see direct benefits will they become involved in it. Networks must therefore be organised in a target-oriented, efficient manner.

The “Holzwende 2020plus” project learning platform provides information on networked market development methods. The online Handwerkerprofil provides an instrument for networking across the value chain (AS Architektenservice, 2007; see also Lippert / Stenzel / Geibler, 2007).

Social competencies and trust are also especially important if networks are to function. Networking activities at the Centrum für Energietechnologie Brandenburg GmbH (CEBra) in Brandenburg within the “Holzwende 2020plus” project show how hard it is for small and medium-sized enterprises in particular to set up joint initiatives (see Henseling / Rupp, 2006). They seem to lack the necessary culture of cooperation, and give priority to their supposed individual and short-term interests over joint action geared to the medium term, even though the resulting synergies would benefit all.

Only a few pioneers are pushing ahead with cooperation between different stages of the value chain. Timber industry enterprises are still unaware of the fact that they form part of a value chain. Sawmills, for instance, often only regard other sawmills as competitors and forget to pay close attention to their relationships with suppliers and customers.

4.5 Transfer in practice: Communicating the results of the “Holzwende 2020plus” project

The results of the “Holzwende 2020plus” project are to be communicated via diverse channels to as many target groups as possible. They include an online learning platform (www.holzwende2020.de/Lernplattform); events, university lectures, seminars and excursions on the subject are also being held. In addition, a network of multipliers is moving forward with concrete implementation

Table 3:
Organisations involved in the project's multiplier network.

Multiplier Network Members
Arbeitsgemeinschaft Deutscher Waldbesitzerverbände e.V.
AS Architekten-Service GmbH
Baukammer Berlin
Bund Deutscher Architekten (BDA)
Bund Deutscher Zimmermeister (BDZ) im Zentralverband des Deutschen Baugewerbes e.V.
Federal Research Centre for Forestry and Forestry Products (BfH)
Bundesinstitut für Berufsbildung (BIBB)
Federal Ministry of Transport, Building and Urban Affairs
Bundesverband Deutscher Fertigtbau (BDF)
European Confederation of Woodworking Industries (CEI-Bois)
German Society for Wood Research e.V. (DGfH)
Deutscher Holzwirtschaftsrat (DHWR)
Deutscher Naturschutzring (DNR)
Deutscher Städte- und Gemeindebund (DStGB)
FSC – Forest Stewardship Council, Arbeitsgruppe Deutschland e.V.
German Timber Promotion Fund (HAF)
Institute of Forest, Environment and Natural Resource Policy, BOKU Vienna
Merk Projekt GmbH
Möbel- und Holzbau-Cluster Linz, Upper Austria
natureplus
PEFC – Programme for the Endorsement of Forest Certification Schemes, Deutschland e.V.
Stora Enso Forest Central Europe GmbH
Verbraucherzentrale Bundesverband (vzbv)
Wald-Zentrum, University of Münster
ZimmerMeisterHaus®

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involving enterprises in the forestry and timber industry, the building sector, company networks, industry, consumer and environmental associations, politicians, scientists, media and other important multipliers (see Table 3).

The results of the “Holzwende 2020plus” project will also be disseminated in diverse publications such as this Final Brochure, the book *Zukunftsmärkte für das Bauen mit Holz* (Future Markets for Building with Wood) and the Holzwende publication series. Information can be downloaded from the website at www.holzwende2020.de.

Future research on sustainable future markets for renewable raw materials can pick up on the “Holzwende 2020plus” project findings. There are many links to the evolving German research agenda for the forestry, timber, paper and bioenergy sector and its integration into the Forest Technology Platform at the European level (FTP National Support Group Germany, 2007). Important topics for research include climate protection and adapting to climate change, adjusting the economy to renewable raw materials, sustainable land use and mobilisation of raw materials, and cascading use systems.



5 RECOMMENDATIONS FOR POLITICIANS, BUSINESS AND SOCIETY

The following recommendations for politicians, business and society can be derived from the results and practical experience of the “Holzwende 2020plus” project:

- Activities of companies, associations and politicians aimed at increasing the use of timber as a building material for new buildings and the refurbishment of old buildings should concentrate mainly on promising markets, as follows:
 - Hybrid materials, new timber materials, “material alliances”,
 - Refurbishment and modernisation market,
 - Redensification of cities,
 - Market segments for new target groups such as the 50+ generation, the “generation of heirs” or ecologically motivated groups,
 - System solutions, all-inclusive packages,
 - Foreign and export markets,
 - System solutions for cascading uses and services centred on secondary raw materials.
- All activities should be geared to sustainability goals relevant to the value chain of construction and refurbishment with wood. New areas of application and technologies, especially, are often accompanied by considerable gaps in knowledge that should be closed by means of appropriate sustainability assessments.
- Strong support should be given to the use of market development methods by companies and intermediates (e.g. associations). Important among them are:
 - Methods that serve customer and user integration (e. g. focus groups, Handwerkerprofil, innovation workshops),
 - Interactive marketing methods (e. g. expert seminars for decision-makers, NABAHO system components catalogue),
 - Networking and network management methods (e. g. network coaching, Handwerkerprofil)
 - Methods that safeguard the sustainability of product design, production, products and services (e. g. Zukunfts-Check HolzBau, resource efficiency calculator, woodpicker).

In this context the online tools developed in the context of the “Holzwende 2020plus” project, i.e. the Handwerkerprofil, resource calculator, Zukunfts-Check HolzBau and NABAHO system components catalogue can provide input for other companies and sectors.

- However, some of the political control instruments and structural frameworks that are important for the success of timber as a building material are incompatible. Indeed, the incentives and goals they provide for the forestry and timber industry and for construction and refurbishment with wood are often contradictory. This suggests the need for further development and cross-sectoral harmonisation of political objectives and control instruments for promoting the

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raw material timber and other renewable raw materials. This should include environmental, climate and resource policy as well as industrial policy, export initiatives, research and development funding and marketing policy on both the supply and the demand side.

Many actors in a wide variety of places must take action in order to really advance the development of sustainable future markets for timber as a building material (see the statements of the Charta für Holz; BMVEL, 2004). Their activities should build on the wide variety of existing approaches and be bundled in a real timber turnaround so as to develop new sustainable markets for timber. Only in this way will it be possible to generate synergies and prevent one action from blocking another. In short, this means that a timber turnaround up to and beyond 2020 is necessary and that there is no alternative to it for developing sustainable future markets successfully.



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What are the main challenges for building and refurbishment with wood?

Which sustainable future markets exist for wood as a building material? What are the most significant trends?

How can these future markets be developed? Which methods are most likely to be successful?

Readers interested in sustainable market development, the future of the forestry and timber industry and in sustainable building and refurbishment will find answers in this brochure. The brochure presents experience gained in implementation projects and analyses conducted within the "Holzwende 2020plus" project.