

A colorful playground spring rider is shown on a surface of wood chips. The rider has a blue seat, a red backrest, and yellow handrails. It is supported by a white metal spring. The background is a soft-focus view of the wood chip surface.

# The eco-cycle of wood and wood-based products

Wood is renewable

Wood and wood-based products  
can have a long life

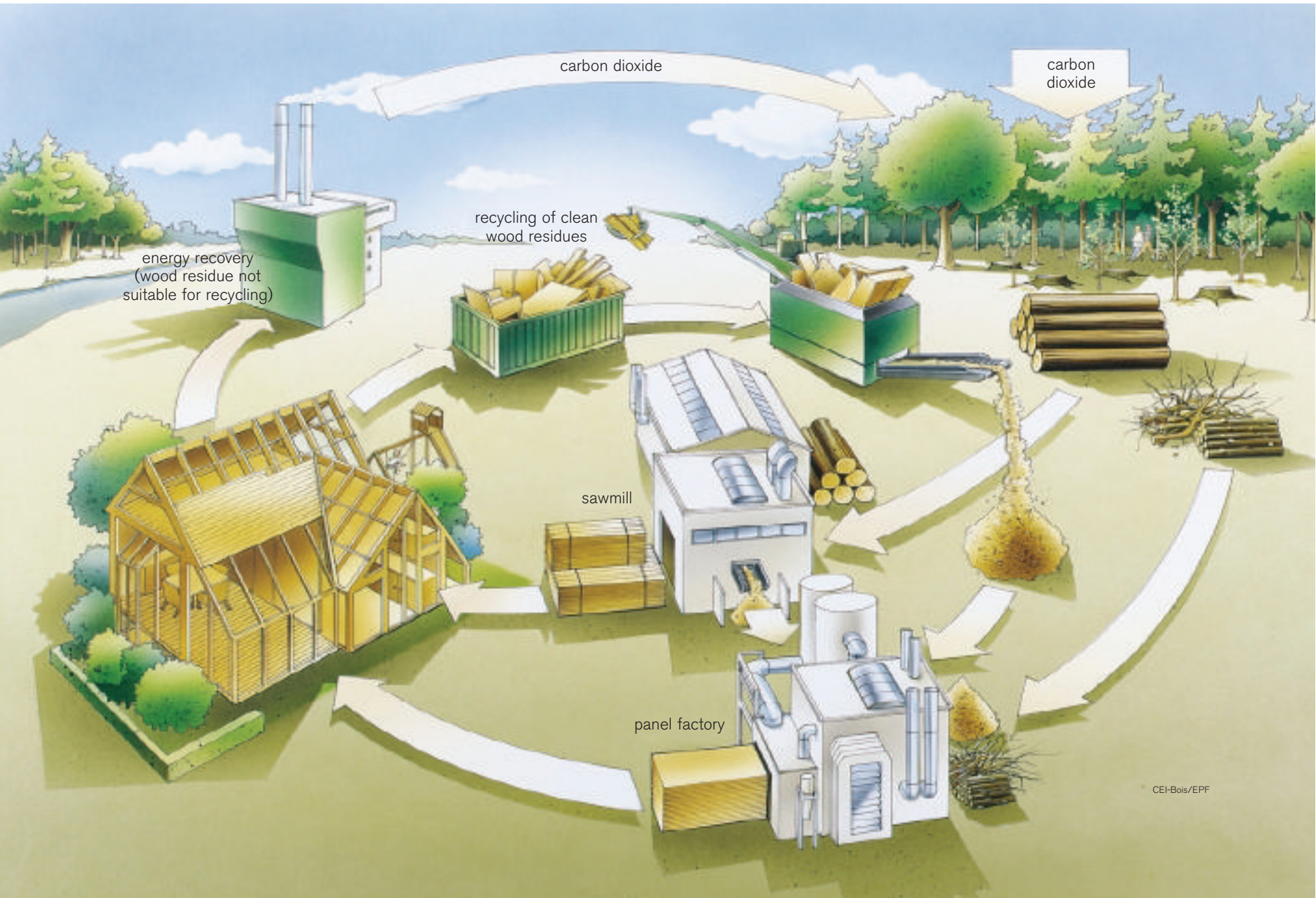
They can often be re-used

They can be recycled

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

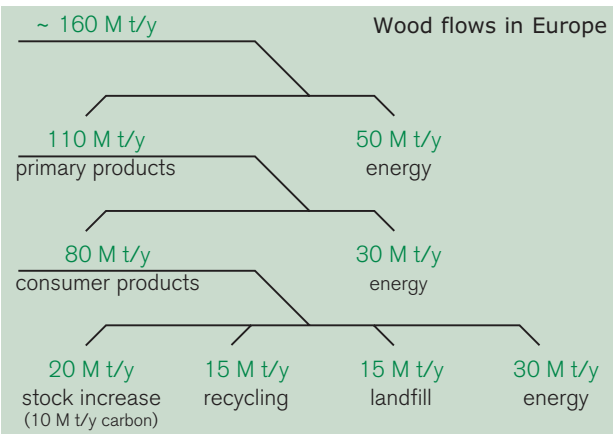


# The carbon cycle of wood-based products



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

Top  
Wood flows in Europe  
Dr A Frühwald, 2004



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

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

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

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

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

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

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

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

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



# Wood re-use

## Reclaimed wood is often highly valued

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

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

## Cities are taking the initiative

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

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

Below

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

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

Opposite left

Primary use of hardwood: poles in a marine application  
EDM

Opposite right

Second use: shingles for outdoors cladding or roofing  
EDM

Opposite below

Wooden pallets can be repaired and re-used

## Re-using long-life products

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

## Re-using pallets and packaging

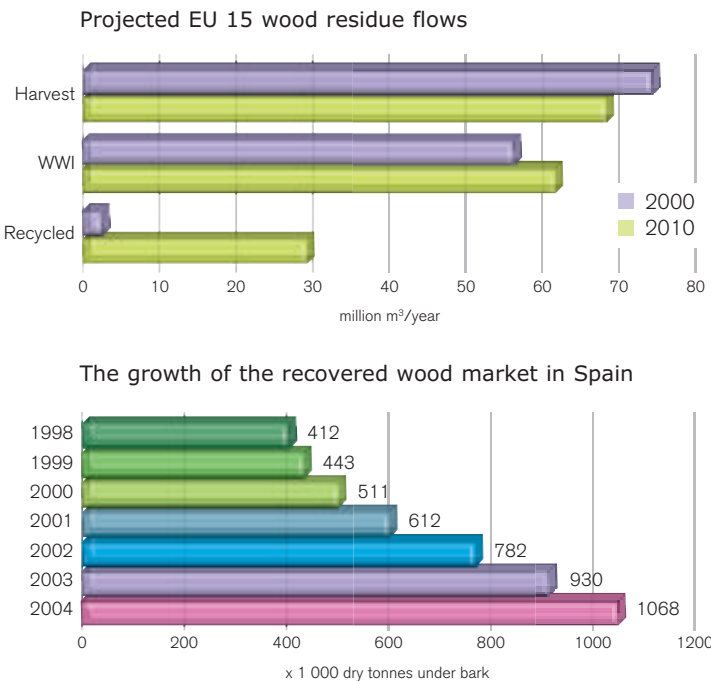
Wooden crates and pallets can also be re-used, with or without repair, which might be carried out by re-using parts of other damaged pallets, or by using new timber made from virgin wood, blockboard or pressed wood chips. Sometimes wood preservative or, increasingly, thermal treatments, are used to enhance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

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





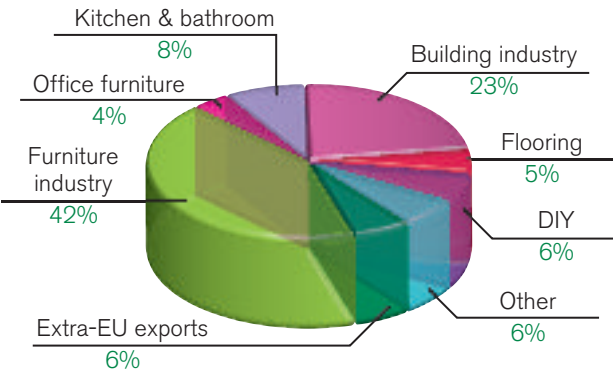
# Wood recycling



## Wood-based panels

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

Particleboard user industries in Europe, 2004

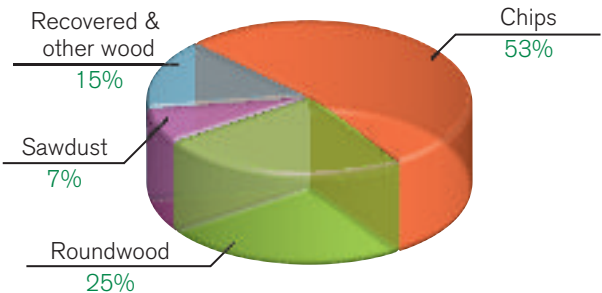


The relative amounts of raw material used depend largely on the local availability of wood resources, but nowadays an increasing amount of post-consumer wood is recycled into wood-based panels. Some companies in Southern Europe even use up to 100% of sawmill by-products and recovered wood because of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

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

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

Raw wood mix in particleboard, 2004

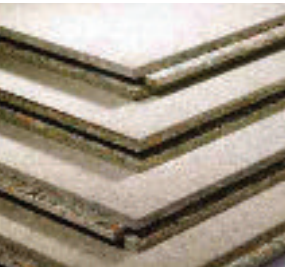


## New developments

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

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

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



Opposite above

Particleboard user industries in Europe 2004  
EPF Annual Report 2004/5

Opposite centre

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

Opposite below

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

Above left

The relative importance of different ingredients in the raw wood mix used for particle board manufacture. % dry tonnes within selected countries  
EPF Annual Report 2004/5

Above right

Particleboard

Centre right

Coppiced or recovered wood can be used to make charcoal  
© Roy KeelerBottom

Below

Recovered wood can be used for surfacing



# Wood and energy recovery

## Wood energy is CO<sub>2</sub> - neutral

Using wood manufacturing by-products and end-of-life wood products as a source of energy is the final link in the virtuous wood cycle. Instead of its energy being wasted in landfill, it provides a carbon neutral substitute for fossil fuels. Since it only returns to the atmosphere the CO<sub>2</sub> that has been taken from it by the growing trees, wood combustion does not contribute to global warming or the greenhouse effect.

## Wood energy is clean

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

## There are many sources of wood energy

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

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

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

Opposite

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







### The balance between energy and product use

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

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

- Acknowledge that the European wood-based industries are a key partner in optimizing Sustainable Forest Management and in maximizing added value and employment from forest resources
- Avoid financial support systems for 'green' electricity that give inappropriate incentives to an unbalanced use of biomass for electricity production only
- Support better mobilization of wood and other biomass, specifically by supporting forest owners' initiatives aimed at improving market access (associations, co-operatives, critical mass supply, etc.), giving them a stronger incentive to practice forest management
- Develop coherent strategies to secure and expand the availability of wood as a raw material, as well as an energy source, taking into account the need to establish a level playing field for all users along free-market principles
- Implement programmes to exploit the large potential of still unused biomass in an economic and sustainable way

- Support activities regarding efficient recovery of forest residues and development of biomass sources specifically grown for energy production
- Foster the recycling of wood by-products and residues by supporting research on collecting, sorting and cleaning technologies and to improve waste regulations (wood residues that comply with quality standards are not waste)
- Formulate a comprehensive definition of wood and non-wood biomass, including secondary wood products and fuels
- Support the establishment of efficient logistic systems for the transport and distribution of biomass
- Favour projects which minimize the distances between biomass harvesting and by-product supply and the site of utilization, leading to lower economic and environmental burdens for transport

- Encourage efficient generation and use of renewable energies, by establishing rules and administrative procedures to guarantee that power plants using biomass are based on combined heat and power technology, utilizing a high share of their fuel input, including their heat production
- Step up R&D in energy technology for biomass utilization, e.g. to further improve the energy efficiency and production of CHP installations, transport logistics, storage conditions, storage positioning systems and new data transmission technologies
- Establish information exchange on R&D results and enhance networking concerning best practice solutions, especially concerning the optimization and integration of the use of wood as a raw material and an energy source within the whole value chain
- Consider wood-based products as carbon sinks under the Kyoto Protocol, thereby acknowledging the contribution of wood-based products to climate change mitigation and the carbon cycle, and recognize their superior eco-efficiency versus other materials, as well as their outstanding properties in recycling with minimal energy use.



Opposite

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

Above

Wood residues suitable for panel production or biomass energy production