

## SUSTAINABLE USE OF WOOD FOR PRODUCTS AND ENERGY: CONFLICT OR OPPORTUNITY?

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**ABSTRACT:** A study “EU Energy Policy Impact on the Forest-Based Industries” carried out in 2000 for the European Commission (DG Enterprise) and the woodworking and pulp & paper industries’ federations (CEI-Bois and CEPI) revealed that the measures set out in the 1997 White Paper on renewable energy, if implemented, would have a considerable impact on the timber and wood residues market.

This paper gives an overview of the present situation of the wood-based panel industry in Europe, which suffers seriously of a scarcity of raw material or increased price levels of these materials, especially because the use of wood biomass for electricity generation is subsidised.

The use of wood as a renewable energy source is widely accepted as a contribution to climate change mitigation. However, the material use of wood for the production of wood-based products lacks similar recognition. Since it is a scientific fact that the prolonged storage of CO<sub>2</sub> in wood-based products generates a carbon sink, increased use of wood-based products should be taken up as carbon sink in the Kyoto Protocol. The paper, therefore, concludes with recommendations on the balanced use of wood for energy use and for the manufacturing of products.

Keywords: biomass resources, wood recycling, non-energy applications

### 1 INTRODUCTION

The European (EU15) woodworking industry (WWI) stands for well over 100,000 companies, 2.7 million employees and an annual turnover of 154 billion EUR [1]. Hence, sustainable availability of wood is crucial for the sector. EPF, the European Panel Federation, represents the European manufacturers of particleboard, MDF and OSB, with a total production in 2004 of 34.3 million m<sup>3</sup> of particleboard, 11.9 million m<sup>3</sup> of MDF and 2.8 million m<sup>3</sup> of OSB on, in total, around 250 particleboard, 60 MDF and 9 OSB lines. Total output of all wood-based panels in Europe amounted to 58.7 million m<sup>3</sup> in 2004, which represents an increase of some 5.6% compared to 2003. Thus, although operating in a very competitive environment the European wood-based panels sector is a growing industry. The principal cost factor is the wood raw material.

The need for an enhanced use of renewable energy sources (RES) as a significant means of meeting the Kyoto targets on the reduction of greenhouse gas emissions, is fully acknowledged and supported by the WWIs and has historically led to an already substantial use of biomass in the sector. For instance, about 65% of process energy needed for drying and heating in sawmills and wood-based panel plants is generated by wood-residues, unsuitable for the manufacturing of products. Hence, the WWIs are and have been for many years contributing to a sustainable use of energy and natural resources by:

- Important energy savings: modern heating and CHP (combined heat and power generation) installations generate the major part of the energy required for our industrial processes from woody biomass, unsuitable for recycling;
- Active involvement in sustainable forest management: European forests expand [2];

- Continuous improvement of recycling rates of wood and wood products through considerable investments in modern technologies.

All these efforts represent a vital contribution to the mitigation of climate change.

### 2 ENERGY POLICY IMPACT STUDY 2000

In 2000, consultants reporting to a joint DG Enterprise/Industry (CEI-Bois/CEPI) Steering Committee, carried out a study “EU Energy Policy Impact on the Forest-Based Industries” [3]. This study revealed that the measures set out in the 1997 EU White Paper on renewable energy, if implemented, would have a major impact on the timber and wood residues market. The target set by the EU White Paper is to double the current contribution of renewables to gross energy production to a level of 12% by the year 2010. Biomass, mainly wood, used for energy generation is targeted to triple its contribution [4].

Market inter-action between the traditional Forest-Based Industries and the renewable energy industry has been simulated until 2010 based on four scenarios: “Business-as-Usual”, “White Paper”, “Foresters” and “Minimum Pain”. “Business as Usual” was a benchmark scenario against which all alternatives were compared. The “White Paper” scenario is based on the EU White Paper policy’s strategy and action plan aiming at doubling the share of renewable sources for energy which calls for an additional demand of 163 Mm<sup>3</sup> of wood, or 27 Mtoe, on top of the “Business as Usual” scenario. A “Foresters” scenario was introduced as the next logical step after the “White Paper” scenario demand shift. Together with higher prices, new volumes of wood, even new types of raw material (e.g. green chips from forest residues), were envisaged to enter the market place. A “Minimum Pain” scenario was elaborated as a third and final alternative to the “Business as Usual” scenario. On top of the forest residues of the

“Foresters” scenario, recovery of industrial residues and post-consumer wood residues was included, as part of the future wood supply.

Even in the situation where all available resources were to be used in an efficient way, the European Forest-Based Industries will severely suffer. Volumes of raw materials available for the production of sawn wood, wood-based panels and pulp and paper are estimated to decrease with up to 17%, 9%, 28% and 12% respectively. Fortunately, the calculation results also showed how improving the supply of wood from various presently unused sources could reduce the negative impact on the Forest-Based Industries. Nevertheless, the EU’s dependency on forest resources from outside Europe is estimated to rise sharply.

The effect of the White Paper policy was also predicted to have a significant influence on price levels. In the EU, round wood prices were calculated to increase in an order of magnitude ranging from 75% in the worst case to 18-26% in the “Minimum Pain” scenario. Prices of forest products in general would also increase. Under the most favourable conditions sawn wood, wood-based panels and pulp prices would rise with 11%, 5% and 13% above the “Business as Usual” price levels respectively.

The study concludes that:

**The industry “will hardly, if at all” be able to absorb the shift which will be induced by the White Paper “without detrimental effects on their competition for wood and hence their overall competitiveness”, and: “A reduced target for wood could be compensated by increased targets for other biofuels, whose production would even have beneficial effects on agriculture”.**

Therefore, it is evident that the major problem for the Forest-Based Industries in the medium and long term will be the availability of wood at a competitive price level.

### 3 THE IMPACT ON THE WOOD-BASED INDUSTRY AS OBSERVED BY END 2004

The Impact Study clearly demonstrates how regulations legitimately intending to mitigate greenhouse gas emissions and promoting the production and use of renewable energy sources are likely to have an adverse impact on the sustainable use of natural resources, in particular woody biomass, by:

- leading to a potential shortage of wood raw material for the wood-based industries, whose environmental credentials have been improving since decades;
- leading to the likely use of other materials and products which are:
  - not renewable;
  - sometimes recyclable and
  - always less energy-efficienthence, less eco-efficient as compared to wood and wood-based products;
- leading to an increased pressure on forest resources, thereby furthermore endangering notably the biological diversity.

Directive 2001/77/EC, on the promotion of electricity produced from RES, was the first initiative to put into practice the 1997 White Paper on Renewable Energy. Many European countries thereupon opted for the easiest way for implementing this Directive: burn more wood and stimulate this evolution by subsidising green energy. Some country case studies gathered by EPF illustrate the consequences of the steadily growing use of woody biomass for the generation of electricity [5]. In general, increasing quantities of more “noble” wood fractions (forest thinnings, wood chips), being raw material for particleboard and MDF-panels are burnt, because stimulating subsidies (e.g. investment support, guaranteed feed-in tariffs...) are permitting the energy sector to pay more for this raw material.

### 4 SUSTAINABLE MANAGEMENT OF RESOURCES & RESPECT FOR THE CARBON CYCLE

Contrary to the management and use of non-renewable resources, Sustainable Forest Management has proven beneficial to the increase of the European forest resource [2, 6]. Moreover, both because of the substitution effect (replacing amongst others non-renewable materials that are requesting a lot more energy for manufacturing) and the life-cycle approach (respecting the carbon cycle), using wood extracted from the forest for manufacturing products substantially contributes to the European strategy of sustainable development.

At present, however, the value chain of the wood resource is not respected, since material that is suitable for the production of wood-based products is being used directly for energy generation. This is particularly the case since the “biomass energy” market is presently not governed by free market principles, as demonstrated above. Furthermore, from a material efficiency point of view, the carbon cycle and wood life and value chain should be respected, so that wooden products, over their lifetime, are functionally cascading first as a primary product that is preferably re-used, possibly recycled and eventually used as a source of energy [7]. This would largely help maximising the carbon retention efficiency of wood and wood-based products and would optimally support climate change mitigation as well.

The WWIs nevertheless see means of improving the situation. The efficiency of harvesting can be upgraded by more intensified usage of wood residues, currently left behind in the forests and generating CO<sub>2</sub> during their gradual decomposition. Techniques for growing forests could be further improved to increase the yield per hectare of forest and to enhance the quality of harvested wood for final applications in paper, timber, or wood-based products. Moreover, additional forestation or short rotation biomass crops could be a valuable solution to give redundant agricultural land a new and environmentally friendly economic destination.

Recycling and reuse of wood and wood-based products deserve more attention [7]. The forest-based industries will continue to improve the quality of their own processes with regard to further reducing the use of primary raw materials, per unit product. On the other hand, government policies for biomass energy need to be

revised or counterbalanced with additional supplies of wood, as mentioned above. The enhanced recovery and use of end-of-life wood could hereby lower the pressure on the market of wood-products for industrial use.

Finally, sustainability includes also important socio-economic aspects. During the last Forest-Based Industries Forum [7], some pertinent figures were published on these issues. Even without taking into account the energy content of wood-based materials at the end of their lifecycle, the added value of wood products was calculated to be 1044 EUR/tonne dry wood, as compared to 118 EUR/tonne for fuel use. Moreover, wood-based products, on average, generate 54 man hours/tonne of dry wood, whereas energy use generates only 2 man hours/tonne. These numbers illustrate just how valuable the sound use of wood-based materials in fact is, largely outweighing sheer burning.

## 5. ACTUAL EFFECTS ON THE EUROPEAN PARTICLEBOARD PRODUCERS [5]

On a European scale, the wood-based panel industry is suffering from the increased consumption of its raw materials for - subsidised - energy purposes. Prices of raw materials have - on average - increased by 50% over the last decade. The particleboard industry therefore gradually turns to the use of recovered wood, because of diminishing availability of sawmill by-products, which are increasingly being used for producing energy pellets or as fuel for electricity power plants [8,9]. Situations differ from one country to the other and regionally, but in countries like Belgium, Denmark, France, Germany, Italy and the Iberian peninsula, where already 20% or more of the raw material for particleboard consists of recovered wood, the trend is more than evident [5,10]. Extra costs for collecting, analysing and cleaning of recovered wood though put additional strain on commercial margins.

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Greenhouse gas emission trading might become a new threat for the wood-based panel industry since many Member States intend to boost the pace for the introduction of biomass energy plants. Moreover, large energy consumers like steel and cement plants are studying the use of (wood) biomass in order to optimise their position on the greenhouse gas emission market. On the other hand, the potential recognition of wood-based products as carbon sinks might offset this evolution.

For the moment, the situation is hence not transparent, since greenhouse gas emission trading rules are still in the making, whereas the recognition of wood-

products as carbon sinks is still in a conceptual stage [11,12].

In general, the wood-based panel industry is considering alternative scenarios like outsourcing and delocalisation to "cheaper" countries. The new European countries have been the first choice, although many recent and planned capacity expansions are taking place further to the East in countries like Bulgaria, Romania, Ukraine and last but not least Russia. Very recently, even China entered onto the scene. Such scenarios would not only be detrimental to employment in the EU's wood-based panel industry, but also to downstream activities like furniture manufacturing, a sector already endangered by growing imports of cheap goods from outside Europe.

EPF convinced the EU Commission to create a working group investigating the consequences of its policies on Renewable Energy Sources and gave a strong input, in co-operation with the pulp & paper industry, the forest owners and the sawmilling sector. Results of these meetings were used by the European Commission in its May 2004 Communication on RES [13]:

- no increase in RES targets, in particular not for biomass;
- additional efforts to develop other renewables (fuel cells, hydrogen);
- promotion of biomass energy crops;
- additional efforts to develop high-efficiency power plants and cogeneration.

Moreover, the European Commission announced the development of a co-ordinated action plan that "should ensure that the use of biomass for energy purposes does not lead to undue distortion of competition". On the other hand, the Commission warns that RES needs to be promoted and stresses that Member States will be urged to increase their efforts. The latter implies that the wood-based panel industry still has to be attentive for unbalanced national, regional and local actions promoting RES and biomass energy use to the detriment of wood availability for the industry.

## 6 CONCLUSIONS

Wood is a multi-functional resource: on the one hand the wood-based industries have an expanding demand for wood as a raw material due to the increasing popularity of wood-based products; these store the CO<sub>2</sub> captured from the air by trees and can thus be considered a carbon sink. On the other hand, the increased use of renewable energy sources (RES) is a key strategy to meet the Kyoto target and to reduce greenhouse gas emissions. The wood-based industries are pioneers in the field of energy and electricity generation based on biomass. The use of wood as a renewable energy source and the use of wood as a renewable raw material both represent a vital contribution to the mitigation of climate change.

Based on extensive application of advanced production technologies in wood processing during the past decades and demand for their products, the wood-based industries have optimised their use of wood raw material within the concept of sustainable development,

taking into consideration economic, ecological and social aspects.

Because of their practice and experience, the wood-based industries are the most competent partner when it comes to develop a strategy to secure a sustainable framework for the wood-value, considering the great variety of wood applications.

Consequently, it is the entire forest-based industries chain, comprising forest owners, woodworking and pulp & paper and downstream industries, which can deliver its extensive expertise when a policy concerning the utilisation of biomass for either thorough mechanical valorisation or for energy generation via combustion is set and further improved.

## 7 RECOMMENDATIONS

In order to ensure a sustainable development of the usage 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 optimising Sustainable Forest Management and in maximising added value and employment from forest resources;
- To develop coherent strategies to secure and expand the availability of wood as a raw material as well as an energy source, considering the necessity to establish a level playing field for all users of the renewable raw material wood, respecting free-market principles;
- To foster the recycling of wood by-products and residues and therefore to support research on collecting, sorting and cleaning technologies and improve waste regulations (wood residues that comply with quality standards are not waste);
- To implement programs to exploit the large potential of still unused biomass in an economical and sustainable way;
- To formulate a comprehensive definition of wood and non-wood biomass, including secondary wood products and fuels (e.g. bark, black liquor, bio-sludge etc.);
- To support activities regarding efficient recovery of forest residues and development of biomass sources specifically grown for energy production;
- To support the establishment of efficient logistic systems for the transport and distribution of biomass;
- To favour projects which minimise the distances between biomass harvesting and by-product supply and the site of utilisation, leading to lower economic and environmental transport costs;
- To establish administrative rules and procedures guaranteeing that power plants using biomass are based on high efficiency combined heat and power technologies;
- To avoid that financial support systems for green electricity give inappropriate incentives to an unbalanced use of biomass for electricity production only;

- To intensify R&D in energy technology for biomass utilisation, e.g. further increase of energy efficiency and production of CHP installations, transport logistics, storage conditions, storage positioning systems and modern data transmission technologies;
- To establish information exchange on R&D results and to enhance networking concerning best practice solutions, especially concerning the optimisation and integration of the use of wood as raw material and energy source within the whole value chain;
- To recognise the superior eco-efficiency of wood-based products versus other materials as well as their outstanding properties in recycling with minimal energy use;
- To consider wood-based products as carbon sinks under the Kyoto Protocol, thereby recognising the contribution of wood-based products to climate change mitigation and the carbon cycle.

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