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**Outlook for Long-term Supply of Demand for Forest Products
on the European Forest Sector Outlook Studies**
Session I

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ABSTRACT

The projections prepared for 37 ECE countries suggested that, in general, consumption of all forest products is growing, but slower than the economy as a whole. Over the next two decades consumption growth will be supported by dynamic development in the eastern part of Europe, but after successful convergence growth is likely to slow down further. The projections are provided up to 2030. This period is significantly characterised by an increasing role of countries currently having economies in transition. The current rates of per capita consumption in the CEEC and CIS are low compared to the EU, most notably in paper products. A significant catching up is expected over the projection period, fostered by relatively higher economic growth. In absolute terms, paper consumption is more than trebling in the CEEC, while the CIS countries are expected to consume almost five times more paper than currently. An increasing share of forest products, sawnwood in particular, are expected to be produced in the CEEC and CIS.

Forest products are facing competition in all their uses, from other materials but also inside the sector. Product improvement and development of new products must continue if forest products are to maintain their competitiveness. Competition with prices is especially critical for standard products. Further, consumer preferences should not change to disfavour forest products. Nor may policies discriminating against forest products be present if growth is to be maintained. These depend on the ability of the sector to promote forest products in terms of basis in renewable material and of governments to accept that wood is a truly environment friendly raw material. In addition to baseline scenario, two alternative development paths for economic and policy environment were described based on policy analysis conducted by UNECE/FAO and the consequent impacts on the forest sector were analysed.

Key words: demand, supply, trade, economic forecasting, econometric analysis, forest industry, scenario analysis.

INTRODUCTION

There are several factors, which make the decision making in the forest sector subject to a substantial amount of uncertainty. Forestry is not isolated from its environment, and many factors in the political and economic conditions shape the sector but are largely beyond its control. However, understanding of the linkages to the operating environment is essential if the external impacts to the sector and the consequences of own decisions are to be anticipated. International trade in forest products is increasing, companies are global and different regions in the world are growing at different phase, thus introducing a substantial international dimension to the industry, which, however, relies significantly also on natural resource and regional and local structures. The long planning horizon in the forest sector sets some challenges as well.

This paper presents the summary results and conclusions from a study conducted for the European Forest Sector Outlook Studies (EFSOS). The purpose of the study was to provide projections for forest products demand, supply and trade. The essential elements for this study are econometric analysis on structural and causal relationships in the economy from the point of view of forest industry (Baudin and Kangas 2003), long-term forecasts for economic growth (Forecasts of the...2002) and policy scenario analysis (Peck et al. 2002). For the full report on projections, see Kangas and Baudin (2003).

SCENARIOS FOR DEVELOPMENT IN ECONOMIC AND POLICY ENVIRONMENT

Baseline scenario

In the baseline scenario, it is expected that no change in economic and political framework will change the operating environment of the forest sector. It means that we expect the functional relationships between economic growth, consumption, production and trade of forest products remain stable. There will be no major changes in consumer perceptions and behaviour and no major technological development will undermine or improve the competitiveness of forest products or replace them in their final uses. The real prices and costs of forest products will remain constant.

For the scenario analysis, two different alternatives for policy and economic framework were created in the secretariat based on a study on the major impacts on the European forest sector (Peck et al 2002). They are presented in the following two chapters accompanied with reasoning of their impacts on GDP growth and prices of forest products.

Scenario I: Increasing conservation, environmental regulation and public awareness

There have been and there are currently several ongoing international processes aiming at improving the quality of the environment. However, an accelerated implementation of stricter environmental standards and national and internationally legally binding regulatory framework, supported by increasing environmental awareness through campaigns and communication to the public, would have a profound impact on the society and environment.

No matter how important sustainable use and equal intertemporal allocation of natural resources are in sustaining long run growth, environmental conservation is usually regarded as associated with economic growth rates lower than in other circumstances, using conventional GDP measures, which, as is well known, have limited coverage of externalities, notably with regard to natural resource "capital". Increasing nature conservation decreases the resources available for production purposes and thus decreases at least possibilities for short term profits. Further, conservation makes the resource scarcer for the production sector and may increase extraction costs and the market price of the resource.

Changing management regimes of resource under utilisation would probably have little impact on economic growth but increasing raw material and final product prices can be expected. One measure to promote environmental, social and economic quality of forest management is certification, which would, taken the overall increase in environmental awareness, increase demand for forest products as environmentally friendly goods, and make consumers willing to pay more for certified forest industry products.

Increasing importance of non-market benefits and non-consumptive uses of forests also call for changes in land use and management practises. State owned nature reserves, as well as private managed forests in countries with the policy of open access, provide the basis for non-market benefits and non-wood uses of forests. However, additional measures would be needed to meet the increasing demand. This could be facilitated by providing private owners with economic incentives to produce opportunities for increasing recreational use for the public. This would decrease the roundwood supply and tend to increase prices.

One crucial element of environmentally friendly policy framework is the energy sector. It is plausible to expect that this would mean tax policy aiming at better competitiveness of renewable energy at the expense of fossil fuels and nuclear energy. The high emission taxes placed on the use of polluting energy sources will increase production costs of the industry, increase products prices and the consequence would be slowing down economic growth rates in the medium and even long-term. Tightening waste management and emission standards will have a similar impact. However, a swift to renewable energy sources will decrease the costs of emission control to some extent. An additional increase in forest product prices is likely to occur along with increasing competition on wood raw material when wood energy becomes a more attractive alternative.

Scenario II: European integration and market liberalisation

In general, European integration and market liberalization are expected to give stimulus to the economy in terms of increased standard of living. This is considered to be a consequence of increased international competition and specialization. Also, real prices are expected to decline slightly in all regions of Europe under these circumstances. The globalisation in itself and the market framework in CITs are expected to push GDP growth rates upwards in all regions of Europe; the EU/EFTA, CEEC and CIS. Obviously, the enlargement of the EU has the largest potential for positive income effects in those countries, which are candidates for the enlargement, while the impact on CIS is expected to be neutral. For the countries inside EU and EFTA a

positive effect of enlargement on the economy can be expected due to international specialisation and competition.

Innovations are expected to be favourable for EU/EFTA countries, where R&D is comparatively high. In an integrated situation innovations may be rapidly transferred to countries with the most favourable investment situation. There is a risk that the different levels of environmental restrictions among countries may create a situation where countries with less ambitious objectives on the environmental conditions may attract foreign investments.

It is expected that increasing innovation activities and the new market concept in CITs will result in lower real prices for all regions, while in the existing EU/EFTA countries lower forest product prices would be the consequence of increased globalisation. Simultaneously, prices in CEEC and CIS may increase due to favourable supply conditions due to increased international competition and specialisation. These factors are most important for the price formation of forest products. Less important are factors such as certification, which may give higher prices in all regions and EU enlargement that may give higher prices in EU/EFTA and CEEC, while the effect in CIS would be neutral. In summary, real forest product prices are expected to decline in EU/EFTA and CEEC, while in CIS they may remain stable or even increase slightly.

MODEL SPECIFICATION

The multiple-equation approach

Two different modelling approaches are applied according to the market characteristics of the country in question. Fully specified demand, supply and trade models are estimated for the countries, which account for most of the consumption and production in Europe (Group I). One of the major advantages of this approach is that it allows us to examine substitutions. The most obvious type of substitution takes place between alternative sources of supply on the demand side, and between directing the production to alternative markets on the supply side. In this framework consumption is considered to be determined by a demand shifter and by domestic market prices as well as import prices. Supply is determined by a supply shifter and by domestic market prices as well as export prices. For solid wood products the chosen demand shifter is the end-use index, while the demand shifter for paper products is GDP.

That is,

$$\text{DEMAND} = \text{fn}(P_d, P_m, X); \text{ and} \quad (1)$$

$$\text{SUPPLY} = \text{fn}(P_d, P_x, Z), \quad (2)$$

where P_d is the price of domestically produced goods, P_m is the import price, P_x is the export price, X is a vector of additional factors that determine demand (demand shifters), and Z is the factor of additional factors that determine supply (supply shifters).

Equations (1) and (2) can be further expanded to reflect the components of consumption and production. The following set of equations is defined:

$$Q^D_D = f(P_d, P_m, D^D); \quad (3)$$

$$Q^M = f(P_d, P_m, D^M); \quad (4)$$

$$Q^D_S = f(P_d, P_x, S^D); \text{ and} \quad (5)$$

$$Q^X = f(P_d, P_x, S^X), \quad (6)$$

where Q^D_D is demand for domestically-produced goods, Q^M is import demand, Q^D_S is supply to domestic markets ($Q^D_S = Q^D_D$), Q^X is supply to export markets, P_d is the price in domestic markets, P_m is import price, P_x is export price, D^D are demand shifters for the domestic market, D^M are demand shifters for import demand, S^D are supply shifters for the domestic market, and S^X are supply shifters for the export market.

Time series cross-sectional approach

The model of demand for forest products is generally formulated by Houthakker (1965) and has been widely used to estimate demand elasticities for commodities. Total (apparent) consumption is explained using price and GDP. For each of the eight product groups, the relationship modelled is:

$$Q^T = f_n(P_m, GDP, Q^{T-1}) \quad (7)$$

where Q^T is apparent consumption, P_m is real import price (unit value), GDP is gross domestic product, and Q^{T-1} is consumption in the previous period. The estimation procedure follows a time series cross-section (TSXS) approach. The methodology is given in Buongiorno (1977, 1978) and Baudin and Lundberg (1987).

SUMMARY OF THE RESULTS

The scenario analysis clearly demonstrated that the forest industry sector is sensitive to changes in the policy and economic framework. Different economic growth rates, development paths, as well as policies affecting land use, cost structure and prices lead to distinct outcomes in terms of market size, trade balance and share of different products and regions of total production (Table 1). The econometric analysis indicated that both production and consumption are sensitive to both changes in overall economic activity and prices of final products and raw materials. There are also significant differences between products, countries and regions in their responses to changes in prices and economic activity. That is why different assumptions will change consumption and production of some products more than those of the others. Also certain countries and regions will gain market share while others will lose. It is obvious, that the major changes are coming from CEEC and most notably from CIS, but the analysis revealed more factors, which need attention in decision taking in the sector.

Conservation scenario, which meant slower economic growth than in baseline, and price and cost increase for all regions and products, would lead to a rather steady development of shares of different regions of production. CIS would be gaining more share, but not to the extent as in baseline and integration scenarios. In terms of share of production, conservation scenario is most beneficial for EU/EFTA and CIS, largely due to more equal growth between regions. CIS would increase net exports in all products. CEEC would increase net exports, excluding panels. In EU/EFTA, the most significant changes would be in panels and paper and paperboard. In EU/EFTA the growth in consumption of paper and board would be reduced, so that EU/EFTA would remain a significant net exporter, since production is not as reactive on changes in prices and economic activity as consumption. In panels, consumption is significantly affected by price increases, and EU/EFTA would become a net exporter, and the region as a whole would significantly increase net exports in panels.

In the scenario, where expanding integration and globalisation, rapid real convergence in the east and strong growth in Western Europe form a favourable symbiosis, there would be a significant increase in the size of the total market. Beyond this largely predicted finding is a more interesting outcome. This refers to a significantly increasing share of CIS on production and the altered trade balance, which leaves EU/EFTA as net importer by the end of the projection period in all categories of forest products. Theoretically CIS production would meet the excess demand in the rest of Europe and a significant quantity of sawnwood could be still left over for exports to Asia, where trade deficit is increasing.

In EU/EFTA, consumption is growing in all scenarios more slowly than the economy as a whole with one exception: in the integration scenario the price decrease has a strong boost on paper consumption and GDP growth rate is exceeded. A similar kind of phenomenon can be noticed in CEEC. In CIS, the growth both in panel and paper consumption is stronger than the economic growth, on average terms over the projection period. This is however, mostly due to rapid growth over the first decade.

The analysis indicated that some products are more vulnerable to changes in prices and economic activity than others. In EU/EFTA, price increase in conservation scenario weakened relatively hard the demand for panels compared to sawnwood and paper. This finding emphasises the importance of cost control if panels are to maintain their competitiveness in relation to sometimes rather aggressive substitutes in construction industry. The same is true for paper industry, since consumption is more sensitive to changes than production. In the conditions of modest economic growth and increasing prices, European producers should find markets outside the region for the excess supply, while during period of rapid economic growth and decreasing prices, domestic production can hardly meet the increasing demand.

An interesting finding concerning all the scenarios is that the higher the growth, the more EU/EFTA will lose market share. This is largely driven by the high speed of real convergence in the transitional countries, but that is not the only factor. Consumption in EU/EFTA is more reactive to higher growth and decreasing prices than production, and would make EU/EFTA more dependent on imports. As investments will provide higher marginal return for capital in the east and production costs would be lower anyhow, a growing domestic market accompanied with

increasing prices would provide additional incentives for capital inflow. However, the integration scenario would require an accelerated economic growth throughout the region, which calls for a high number of growth promoting factors being present at the same time.

Table 1. Key figures form baseline (base), conservation (I) and integration (II) scenarios. scenario¹.

	EU/EFTA			CEEC			CIS		
	Base	I	II	Base	I	II	Base	I	II
GDP growth, %/a	2.2	1.7	2.6	4.3	2.8	5.4	4.6	2.7	6.0
Consumption growth, %/a									
Sawnwood	0.8	0.4	1.2	2.0	1.3	2.7	4.4	2.3	5.7
Panels	1.6	0.9	2.4	3.0	2.0	3.9	5.1	2.9	6.8
Paper and board	2.1	1.4	2.8	4.2	2.7	5.4	5.2	2.8	6.8
Production growth, %/a									
Sawnwood	0.9	0.5	1.3	2.0	1.3	2.6	4.5	2.4	5.9
Panels	1.8	1.2	2.4	2.8	2.1	3.4	5.0	2.7	6.5
Paper and board	1.8	1.2	2.4	3.8	2.5	5.0	5.2	2.8	6.7
Share of total production , % in 2030									
Sawnwood	45.0	54.1	44.9	15.9	17.6	15.7	39.0	28.3	39.4
Panels	63.8	69.0	60.1	16.2	17.4	15.4	19.9	13.6	24.5
Paper and board	77.8	83.6	73.9	8.8	7.7	9.7	13.4	8.6	16.4
Net trade, unit million in 2030									
Sawnwood	-7.7	-7.1	-8.8	14.8	13.1	16.8	32.5	17.0	49.2
Panels	0.5	2.5	-2.9	1.6	2.9	0.5	4.3	2.5	6.5
Paper and board	3.6	7.4	-1.6	-4.9	-2.8	-7.6	6.8	3.4	10.2

CONCLUSIONS

The economic analysis conducted here contained several built-in assumptions, which needs to be met if the growth in consumption and production in Europe is to be realised. Forest products are faced by competition in all their uses. Over the years, there has been product development. Existing products have been improved to better respond to needs of the markets. New products

¹ EU/EFTA countries refer to 15 European Union member countries and Iceland, Norway and Switzerland; CEEC refers to Albania, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia, The FYR of Macedonia, and Yugoslavia; CIS refers to Belarus, republic of Moldocva, Russia, and Ukraine

have been developed. Product development should continue so that growing economy would consume more forest products.

The growth rates of different products reflect the growth rates of the end-use sectors, which are generally growing slower than the economy as a whole. In order to reach the same growth rates with end-use sectors, forest products should maintain their competitiveness. The analysis indicated the vulnerability of forest products to price changes and thus emphasises the importance of cost control in production. Sawnwood and panels, seemingly more panels, are subject to competition from substitutes in construction industry. Forest products are competing with each other as well in many of their uses. Cost efficiency but also product development and innovative new uses of wood will be important means in competition with materials like steel, concrete and plastic.

The position of paper as the fastest growing category of forest products is often seen as being at risk due to a continuous fear of replacement by electronic solution in information sector. Replacement has not taken place and development of office technology has been more or less mutually beneficial for the producers of printing and writing paper. However, there are some indications of structural changes in the markets, the most well-known being the decline of newsprint consumption in United States since 1987 (Hetemäki and Obersteiner 2001). In any case, information sector is becoming more and more important for the paper industry, since for example consumption of household paper is not likely to increase radically due to stagnating and even decreasing population.

In general, it is hard to foresee policy, which would disfavour forest products. However, the success of forest products is conditional to consumer perceptions and the ability of the sector to promote forest products in terms of basis in renewable material. As recyclable, forest products should benefit from increasing environmental awareness if the attitudes are strong enough to have an impact on consumer behaviour. More stringent environmental standards and waste management policies should favour forest products and increase their competitiveness.

Competition will increase and the highly developed countries will lose market share due to high production costs and lower marginal returns to capital compared to lower income countries. From the point of view of forest industry in the EU, there will be increasing competition also in the domestic markets. Especially this is the case with relatively lower value added standard products, where critical factor in competition is the production cost, which would call for strategies like product differentiation and specialisation. Quality can be used in competition but its importance is likely to decrease over the years when production technologies approach each others in all countries.

In all the scenarios demand for forest products is increasing and it implicitly requires more raw material. The analysis of the impact of different scenarios on the use of forest resources was outside the scope of this paper and will be discussed elsewhere. However, it is too important a question to be overlooked in the discussion. There are two main elements concerning the roundwood availability for growing industry. First, is possible to provide the increasing amount of roundwood on a sustainable basis? Second, is it possible in economic terms? The behaviour of

forest owners in Europe was not analysed in this study and the impact of price changes on their willingness to sell remains open for speculation. In general, there is still limited information on the factors affecting the behaviour of forest owners as well as roundwood trade flows. However, there is some evidence that forest owners are sensitive to price levels in their selling behaviour (e.g. Loikkanen et al. 1986, Brännlund 1988, see Solber and Moiseyev 1997 for an overview). The reactions of forest owners are important especially in the integration scenario, where a significant increase in the total size of the market is accompanied by a decrease in roundwood prices.

Furthermore, in conservation scenario an increasing environmental awareness was assumed. It was also expected, that non-market benefits and non-wood uses of forests would gain more importance. If forest owners value increasingly forest uses other than wood production and if they are even offered economic incentives to provide basis for non-wood uses for the great public, what kind of impact it would have on roundwood supply? However, there should be alternative strategies to secure the roundwood flow to the industry even in the case when roundwood supply is restricted or reduced. This would mainly concern producers in the EU, taken the developing domestic industries especially in Russia, but Central and Eastern European countries as well, which will increase competition on roundwood and most likely decrease the possibilities to rely on increasing roundwood imports from the east.

However, the increasing demand for forest products cannot be straightforwardly translated into increasing roundwood removals and consumption of virgin fibres. Recycling of paper is far from theoretical physical maximum in many countries. The use of processing residues is likely to increase as well, along with increasing competition on raw material, importance of cost control and development of vertically integrated production units. Technological development will also change the input/output ratios.

In this study, alternative land uses like conservation, agriculture, and energy production, were analysed in terms of price changes, but they affect the physical availability of land for roundwood production. Those factors may have profound impact on roundwood availability and cause significant relocations of removals.

Changes in the economic and political environment affect forest sector on various ways. However, as concluding remark the feedback and importance of forest sector to the economic and social development should be mentioned. Significant changes in the forest sector will affect the economy as well, taken, for example, the importance of forestry in rural development, in shaping the income distribution and in generation of export earnings. It can be seen from the strategies of some central and eastern European countries, that forestry is gaining more importance in new, comparative advantage driven strategies in countries with economies in transition. There the sector will not be only affected by economic restructuring, but will promote economic growth as well. Forest sector shall carefully follow the needs of the society but also the preconditions of the sector are likely to be recognised in policy making in European level.

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