A SUMMARY OF "THE COMPETITIVE CLIMATE FOR WOOD PRODUCTS AND PAPER PACKAGING: THE FACTORS CAUSING SUBSTITUTION WITH EMPHASIS ON ENVIRONMENTAL PROMOTIONS"

Based on a study performed by the Substitution Project Subgroup of the Joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector

by

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ABSTRACT

This Discussion Paper presents an extended executive summary of the report ‘The Competitive Climate for Wood Products and Paper Packaging: the Factors causing Substitution with Emphasis on Environmental Promotions’. The summary is based on a study performed by the Substitution Project Subgroup of the joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector with the overall objective to promote increased international co-operation within the sector. The study investigates the nature of the wood and paper packaging industries and their competing industries, with special focus on environmental promotion. It includes some of the relevant examples of the situation in North America, Europe and Japan.

This summary gives an overview of the wood, paper packaging, plastics, aluminium, steel, concrete and gypsum industries, and compares the forest industries to its competitors. Some factors affecting substitution of forest products are highlighted, as well as consumer awareness of environmental issues. Market shares and trends are discussed, dealing with construction, windows and doors, and packaging, to some extent. The report concludes that substitution of forest products by competing products is accelerating and that a number of actions are necessary.

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The four-colour report includes 71 figures and 13 tables (see appendix). It also includes 38 facsimiles, exemplifying environmental promotion and advertising activities by the forest plastics, steel and concrete industries. The report can be ordered from:

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Another objective of the Discussion Papers is to stimulate dialogue and contacts among specialists. Comments or questions should be sent to the secretariat, who will transmit them to the authors.
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FOREWORD BY THE SECRETARIAT

This extended executive summary of the larger study report, "A summary of the competitive climate for wood products and paper packaging: the factors causing substitution with emphasis on environmental promotions", is produced in the UN-ECE/FAO Timber and Forest Discussion Papers series in order to give wider distribution of the key findings as requested by the UN-ECE Timber Committee and the FAO European Forestry Commission. The study was the responsibility of the joint FAO/ECE Team of Public Relations Specialists in the Forestry and Forest Industries Sector, especially their Substitution Project Subgroup.

At the time of printing, the Team is planning an International Forestry Communications Forum 2000 and this study report will be a central focus. Readers interested to participate in the Forum are encouraged to contact the leader of its planning subgroup, Mr. Yves St-Onge (Chef des communications, Service Canadien des Forêts, Ministère des Ressources naturelles, 580 rue Booth, 8ème étage, CDN - OTTAWA, Ontario K1A OE4; fax: + 1 613 947 73 45; telephone: + 1 613 947 73 97; e-mail: YstOnge@NRCan.gc.ca.

The secretariat expresses its warm appreciation for the study to the entire Substitution Project Subgroup and especially its leader, Ms. Berit Sanness, Executive Project Manager, Living Forests, Norway. Additional thanks go to all the authors and contributors who are fully listed in the acknowledgements. A special thanks to the co-editors, Mr. John Burrows and Ms. Sanness for their dedicated efforts and perseverance in producing the report.

More information on the FAO/ECE Team of Public Relations Specialists and their work is included in the introductory pages of this discussion paper and on their website which may be found under the ECE Timber Committee site at: http://www.unece.org/trade/timber.

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THE JOINT FAO/ECE
TEAM OF PUBLIC RELATIONS SPECIALISTS
IN THE FOREST AND FOREST INDUSTRIES SECTOR

The Joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector was established in 1992 by the FAO European Forestry Commission and the ECE Timber Committee to support the overall goal of creating a positive image of the forest and the forest sector (including all phases of forest resource management and forest industry).

The Team has produced Communications Strategies in Forestry and Forest Industries sector (also known as “PR Tool Kit”); convened 8 meetings (Fontainebleau, France; Tällberg, Sweden; Québec, Canada; Gmunden, Austria; Biri, Norway; Sesimbra, Portugal; and Sagadi, Estonia); organised a workshop for countries in transition, produced a poster for the 1996 FAO World Food Summit and published Forest and Forest Industries Country Fact Sheets. It has broaden the network between communicators in the sector, increased the awareness of internet as a tool for communication, and provided PR follow-up on ETTS V and other activities of the parent bodies. The Team has established subgroups to deal with key issues, such as “Women as Key Consumers”, “Substitution Project” and “International Forest Communicators Forum 2000”.

In early 1999, 26 countries have nominated 40 Team members from the ECE region (Europe, North America and the Commonwealth of Independent States).

More information about the Team is available on its website (under the Timber Committee site) at: http://www.unece.org/trade/timber/pr

Ingwald Gwandtld
Team Leader

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PREFACE

Wood and paper packaging products are being replaced by competing materials at a fast pace. In some cases, substitution is resulting from environmental claims that are erroneous, incomplete, or unproven.

This Discussion Paper has been made to extend the availability of key results from the complete study The Competitive Climate for Wood Products and Paper Packaging: the Factors Causing Substitution with Emphasis on Environmental Promotions, published as a separate report. The study provides an overview of the situation concerning the forest industry, as well as the competing plastics, aluminium, steel, concrete and gypsum industries, with special focus on environmental promotions.

There are not yet universally approved standards that allow a fair comparison between materials. As forests are renewable natural resources, products from the forest industry are good choices in the context of global climate change, recycling and energy recovery. Even the industry production is energy efficient.

The substitution study was performed by the Substitution Project Subgroup of the joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector, as a result of a Norwegian initiative, recognising the need for international co-operation to gather information about product substitution and promotion.

There is still a need to continue gathering information and to conduct more studies to follow the competitive climate for wood products and paper packaging. An understanding of factors causing wood and paper packaging product substitution is a first step in helping governments and consumers make informed decisions about the use of world resources in an equitable and careful manner.

The Subgroup underlines the urgent need for actions to take place regarding the competing materials. Hopefully the study and this Discussion Paper contribute to increased general understanding and awareness among the forest and the forest industries, and to further international networking and co-operation to promote the sound use of wood and other forest based products as environmentally friendly and renewable resources.

On behalf of the
Substitution Project Subgroup

Berit Samness
Chairperson

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ACKNOWLEDGEMENTS

This Discussion Paper is based on a study performed by the Subgroup Substitution Project of the Joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector, and published as a separate report in 1998. In general, the performance of the complete study was based on effort at no pay. In addition, some financial support was needed for consultancy work and publishing.

We would like to express our gratitude to the most generous financial support and contribution from the Living Forests Project (financed by Norwegian forest owners, forest industries and government) to prepare and co-ordinate the Subgroup’s work. Furthermore, we are most grateful to Canadian Wood Council, the Finnish Forest Association / ‘Time for Wood’ Project, the Ministry of Agriculture of Portugal, the Austrian Ministry of Agriculture and the Nordic Timber Council for their financial support and contribution to finalise the study. Also the American Forest & Paper Association contributed with input to several subchapters, for which we express our gratitude.

We would like to thank the Danish Forestry Association, the Danish Wood Industry, ’Wood is Environment’ - Project Denmark, Office National des Forêts (France), Great Britain Forestry Commission and the National Board of Forestry (Sweden) for adding financial support to publish the complete report.

The study is a result of contribution from a number of key people and organisations. The Subgroup would particularly like to thank Mr. John Burrows, Senior Manager at the Canadian Wood Council, for his very important contribution as co-editor. We would also like to thank Ms. Elisabeth Gill, Project Officer at Living Forests Norway for her helpful contribution assisting the editors when finalising the report.

Valuable comments were given by Mr. Egil Molteberg at Living Forests Norway, Mr. Ed Pepke at the Timber Section, Trade Division, UN-EC/FAO, Mr. Ian Hunter at the European Forest Institute, and Ms. Dawn McNiven at the Forestry Industry Council of Great Britain, for which we express our deepest gratitude.

During the preparations we also received valuable input from Mr. John Park at the Council of Forest Industries of British Columbia (Canada), Mr. Denis Jelacic at the University of Zagreb (Croatia), Ms. Jaana Kaipainen at the Finnish Forest Association, Mr. Pierre Bonninaire at the Ministry of Agriculture and Forestry of France, Ms. Annie Nief at the Office National des Forêts (France), Mr. Johan A. E. Stolp at the Stichting Bos en Hout (the Netherlands), Mr. Aasmund Bunkholt at the Norwegian Sawmill Industries, and Mr. João de Sousa Teixeira, Direcção-General das Florestas (Portugal). We are very grateful for their assistance.

The Subgroup would also like to thank Mr. Kristian Lein and Mr. Ståle Stordal at the Eastern Norway Research Institute, for their inputs to chapters 3-6, as well as Mr. Petri Vassara and Mr. Ari Tarjanne at Jaakko Pöyry Consulting for their assistance with elaborating chapters 2-8 on a consultancy basis.

Furthermore, we particularly would like to thank Mr. Ewald Rametzsteiner for preparing chapter 10 on Europe, and also Mr. Stefan Weinförter, for preparing chapters 13 and 14 concerning the situation of Austria, both at the Universität für Bodenkultur (Austria).

Oslo / Vienna / Ottawa / Helsinki / Stockholm / Washington, 10 February 1999

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Mr. Juhani Karvonen (Finland)  Mr. Jan Hagstedt (Nordic Timber Council)  Ms. Pat Layton (United States)
EXECUTIVE SUMMARY OF THE COMPLETE REPORT

Part I - Introduction

Chapter 1 - Introduction

Background
In 1990 the issue of global deforestation, led to slogans such as ‘Save a tree, use PVC’. The public could not differentiate between managed sustainable forestry and deforestation, which was occurring in some regions of the world.

Since then, every resource-based industry has claimed environmental advantages for its products. Wood and paper packaging products are being replaced by competing materials such as plastics, aluminium, steel, concrete, and gypsum.

The Co-chairmans’ report of the Intergovernmental Panel of Forests of the UN Commission for Sustainable Development (1997), underlines the need for actions towards the promotion of wood as an environmentally friendly material. The Panel called upon relevant organisations to support efforts to gather more information and conduct more independent market and economic studies of potential competition between wood and non-wood substitutes, analysing the costs and benefits, including any substitution effects, and the overall impact on the management, conservation and sustainable development of all types of forests.

At the Third Ministerial Conference on the Protection of Forests in Europe, held in Lisbon in June 1998, the ministers responsible for forests in the Pan-European region committed in the general declaration to taking action to stimulate and promote the sound use of wood and other forest based products as environmentally friendly and renewable resources.

This Discussion Paper presents an extended executive summary of the report The Competitive Climate for Wood Products and Paper Packaging: the Factors Causing Substitution with Emphasis on Environmental Promotions. The summary is based on a study performed by the Substitution Project Subgroup of the joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector with the overall objective to promote increased international co-operation within the sector. The study investigates the nature of the wood and paper packaging industries and their competing industries, with special focus on environmental promotion. It includes some of the relevant examples from the situation in North America, Europe and Japan.

Wood and paper packaging products are manufactured and used throughout the world. It is important from a social, economic, and environmental standpoint to understand the factors causing the substitution of wood and paper packaging products. The substitution study pays particularly attention to the environment, even if that issue is only one of the driving forces causing substitution.

If products from the plastics, aluminium, steel, concrete and gypsum industries are replacing wood and paper packaging products, is this substitution beneficial to the environment?

The forest is a renewable natural resource. Therefore, products from the forest industry are a good choice in the context of global climate change, recycling and energy recovery. Even the industry production is energy efficient. On the other hand, the forest industry has met increasing demand for certification to prove that the raw materials come from sustainable managed forests. So far, it does not seem as similar demands have been raised to the competing industries concerning the production of their raw materials. Why is that?
As populations soar and natural resources diminish, it is increasingly important that product selection be based on a scientific assessment of the overall impact of extraction, manufacturing, transportation, use and disposal. Life cycle analysis might be a very helpful tool to solve this, though the item is not included in this report.

Objective
The effort to gather information about industries that compete with wood and paper packaging was initiated by the Norwegian Living Forests project. It recognised a need for international co-operation to gather information about product substitution. In 1996, the efforts of Living Forests were endorsed by the joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector and supported by their parent bodies, the Food and Agriculture Organisation of the United Nations (FAO) European Forestry Commission and the United Nations Economic Commission for Europe (ECE) Timber Committee.

The Team of Specialists formed a Subgroup to complete an analysis of the factors leading to the substitution of wood and paper packaging products. Representatives from Austria, Canada, Croatia, Finland, France, the Netherlands, Nordic Timber Council, Norway, Portugal, the United Kingdom and the United States contributed to the study.

The objective of the Substitution Project is:

- to provide information about the wood and paper packaging industries and their competitors, in order to better understand the reasons for product substitution and to increase international co-operation and network building within the forest and the forest industries sector.

The objective has been reached by:

- giving an overview of the forests, plastics, aluminium, steel, concrete and gypsum industries, including their production volumes, production by country, ownership, size, structure and fragmentation;
- describing the main organisations and activities dealing with the promotion and the environmental concerns for these industries with emphasis on European and North American organisations;
- when possible, reviewing price trends of the wood and paper packaging, plastics, aluminium, steel, concrete and gypsum industries over the last 20 years;
- describing trends on environmental awareness among consumers in some key countries;
- describing environmental non-governmental organisation's and councils in some key countries;
- describing governments and policies encouraging competing materials;
- giving examples of campaigns, advertisements and brochures which promote the environmental benefits of forest industry products and substitute materials.

The results of the project form a basic market intelligence for advancing the messages describing wood as an environmentally friendly material.

Part II - The Building and Packaging Products Industry

Chapter 2 - The Forest Industry

The world's forests are estimated to cover 3.454 million hectares, or 26.6% of the total land area of the world (Greenland and Antarctic excepted) in 1995. The total global consumption of wood fibre is about 3,250 million m³ annually. Most of this fibre (54%) is used as fuelwood, primarily in Asia, Africa and Latin America. The wood products industry, using sawlogs, veneer logs and other industrial roundwood, accounts for 33% of global wood use, and 13% is used as pulpwood. North America consumes approximately 40% of the construction wood and more than 30% of the pulpwood.
During the past 15 years, the forest products industry has grown by an average of 5% annually. An increased proportion of paper fibre comes from recycled sources. The cost of wood fibre is still the dominating factor in forest industry production. Today the regions with low cost fibre are from climates with favourable growing rates such as Brazil, Chile, the U.S. South, Australia, New Zealand, South Africa and Southeast Asia.

Forest products are made and sold globally, but only a few companies can claim to be truly multinational. The concentration of the pulp and paper industry ownership is increasing, but mechanical wood industry is still very fragmented.

All forest industry products are subject to substitution in one way or another. Wood substitution is strongest for framing materials, windows and doors, mouldings and casework, cladding, furniture, pallets and packaging.

Forest practices vary from region to region. Concerns about deforestation continue for tropical regions while in northern regions, replanting and planned harvesting is resulting in an increase in forested area compared to twenty years ago. Even so, the demand for forest certification has been on the rise especially for boreal forests.

Chapter 3 - The Plastics Industry

Global production of plastics stands at about 100 million tonnes annually. Global production of PVC, which is the main plastic material for construction purposes, is about 21 million tonnes per year. The majority of plastics are used for consumer goods, but building products is also an important market for plastics. The use of plastic products has shown a significant increase over the past two decades. In Europe, the use of plastic products grew on average 6.3% annually from 1985 to 1994.

In both Europe and the U.S., the production of plastic materials is dominated by large multi-national companies that combine the production of plastic materials with the manufacture of other chemical and petrochemical products. In addition, the petrochemical sector is relatively closely linked to the oil refinery industry.

Packaging, windows and doors, cladding, decking, and outdoor furniture are products which have been particularly susceptible to substitution by plastic products.
As the plastics industry uses finite oil resources, plastic production competes for the same raw material used for energy production which may result in environmental scrutiny. However, the plastics industry is not yet being pressured to develop certification systems.

Chapter 4 - The Aluminium Industry

The manufacture of primary aluminium from alumina and bauxite requires a great deal of energy. Aluminium is easily recycled and has a high rate of recovery for the manufacture of secondary aluminium. The annual production of primary aluminium is about 19.5 million tonnes, while secondary production is about 7-8 million tonnes. Beverage packaging is a very important aluminium in the U.S., whereas construction is the most important sector in Europe. In recent years, aluminium production has increased by approximately 3% per year.

The aluminium industry is both concentrated and vertically integrated. The two largest producers have a combined production capacity of around 25% of the world capacity.

Competition with forest industry products is limited due to the very different properties of the materials. Competition occurs for products such as packaging, windows and doors, structural members for concrete form work, and roof and cladding materials.

The most important environmental issue for the aluminium industry is the energy required to manufacture primary aluminium. Aluminium products are easily recycled, and significantly less energy is required to manufacture secondary aluminium. The aluminium industry has not attracted a lot of attention from environmental groups, and no certification has been proposed for primary aluminium.

Chapter 5 - The Steel Industry

In 1995, world steel production was about 750 million tonnes. In addition, about 435 million tonnes of steel are recycled each year. Construction is a very important sector for the steel industry.

Ownership of the iron and steel industry is concentrated. The 10 largest European steel producers are responsible for about 80% of the production in Europe.

Steel is a major structural material for long-span structures, such as bridges and high-rise buildings. Light-frame steel is the most significant competitor to wood-frame construction.

The steel industry is just beginning to integrate the environmental issues for the mining and refining of iron ore into the mineral development strategies. Very little environmental activism has been directed at the steel industry, and there has been no demand for the certification of steel manufacturing.

Chapter 6 - The Concrete Industry

In 1996, global production of cement, the main ingredient of concrete, was 1 488 million tonnes, an increase of 4.6% compared to 1995. The largest increases in production took place in Asia and America, while production in Europe decreased slightly.

The cement industry is fragmented, but consolidation is occurring.

Concrete competes with both steel and wood in the manufacture of building products. In residential construction, a construction technique which combines concrete in forms of insulated panels is gaining market share.
The environmental issues facing cement and concrete are the use of non-renewable materials, energy consumption during cement production, and limited reuse possibilities.

Chapter 7 - The Gypsum Industry

Gypsum is a mineral that has many uses in construction. U.S. sales have increased from 630 tonnes in 1992 to 2,420 tonnes in 1996. Asia is the fastest growing market for gypsum.

The gypsum industry is rather concentrated in North America, and has become even more concentrated in recent years. Four companies produced over 60% of all natural gypsum in the U.S. in 1996.

Gypsum wallboard compliments both wood-frame and steel-frame construction by improving the fire resistance of building assemblies.

The most important environmental issue for the gypsum industry is the surface disturbance and wastewater generation from mining.

Chapter 8 - Comparing the Forest Industry to its Competitors

The forest and aluminium industries are strong in North America and Europe, while steel and concrete production is strongest in Asia. Plastic production is spread rather evenly among the three regions.

As a whole, the forest products industry is one of the most capital intensive industries in the world. The investment cost for many products is as large as or larger than the fibre cost component. The wood products industry is much less capital intensive than the paper and paper packaging industries. The production of aluminium and steel require significant capital inputs as well, but the plastic and concrete industries are somewhat less capital intensive.

Ownership in the forest industry, particularly in the wood industry, is more fragmented than the industries it competes with. The concentration of the pulp and paper industry is increasing, but mechanical wood industry is still very fragmented. The industry structure and organisation of the plastics and aluminium industries facilitate the raising of funds for lobbying and public relations because ownership is more concentrated.

On request of the Substitution Project Subgroup, Jaakko Pöyry Consulting made an industry benchmarking semaphore, summarising the strengths and weaknesses of several industries, as shown in the next figure.
Based on this, the steel industry seems to be the strongest of the industries shown, followed closely by plastic and aluminium. However, demand for steel is beginning to plateau. Paper products, on the other hand, are predicted to increase.

In the past, the most important environmental issues for all the industries were emissions, discharges and waste. These are still very important issues and likely to remain high on the environmental agenda. However, increasingly the focus is shifting towards raw material procurement.

The forest industry has a considerable effect on its surroundings, but has many advantages over competing materials. Its raw materials are renewable, it utilises advanced production techniques, and produces safe products that can be recycled or disposed of low environmental impacts. Unlike many competing products, it is possible to recover the energy content of the forest products. Paper products, steel, and aluminium have the highest recycling rates.

On request of the Substitution Project Subgroup, Jaakko Pöyry Consulting also made an environmental benchmarking semaphore, summarising the strengths and weaknesses of several industries from an environmental point of view, as shown below. The benchmarking follows the life cycle, from raw material sourcing to end use and recycling.

**Figure 2: Industry benchmarking semaphore**

<table>
<thead>
<tr>
<th>FOREST</th>
<th>PLASTIC</th>
<th>ALUMINIUM</th>
<th>STEEL</th>
<th>CONCRETE</th>
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</thead>
<tbody>
<tr>
<td>Relations with complementing industries</td>
<td></td>
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<tr>
<td>PR and lobbying resources</td>
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<td>Industry structure</td>
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<tr>
<td>R&amp;D resources</td>
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<tr>
<td>Size of industry</td>
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</tbody>
</table>

- = strength
= OK
= weakness

Source: Jaakko Pöyry Consulting, 1998

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**Figure 3: Environmental benchmarking semaphore**

<table>
<thead>
<tr>
<th>FOREST</th>
<th>PLASTIC</th>
<th>ALUMINIUM</th>
<th>STEEL</th>
<th>CONCRETE</th>
</tr>
</thead>
<tbody>
<tr>
<td>End use and recycling</td>
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<td>Energy consumption</td>
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<tr>
<td>Processing, health and safety</td>
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<tr>
<td>Raw material procurement</td>
<td></td>
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<tr>
<td>Renewability, abundance</td>
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</tr>
</tbody>
</table>

- = strength
= OK
= weakness

Source: Jaakko Pöyry Consulting, 1998
The environmental benchmarking shows an environmental advantage for wood products with harvesting the main weakness. Most consumers understand the link between forest harvesting and product manufacturing, whereas not many consumers link the plastics industry with oil drilling, the aluminium industry with bauxite mining, or the steel industry with mining.

Increasing emphasis on global warming and the need to curb greenhouse gases strengthens the forest industry’s environmental position. This is due to the sequestration of carbon dioxide during wood growth, energy efficiency of production, and recycling and energy recovery of discarded products. In the context of global climate change, forest products are a better choice than substitute products.

For forest products, steel and concrete are the toughest competitors in construction, while plastic and aluminium are the toughest competitors in the packaging sector. These are also important sectors for the competing industries. The competitive situation and vulnerability in different sectors are summarised in two groups of product sectors as follows:

- highly vulnerable and highly contested: consumer packaging, building cladding materials, and framing materials;
- non-vulnerable and important to the forest industry while not so important for the competing industries: transport packaging, pallets, flooring, wallpaper.

Part III - Substitution

Chapter 9 - Factors Affecting the Substitution of Forest Products

Product preference is constantly changing due to product innovation and changing consumer preferences. This Discussion Paper, as well as the complete substitution survey, highlights the environment and the promotion of environmental qualities but this does not mean the environment is the main reason for substitution. Product price, both purchase cost and maintenance cost, continues to play a key role in product selection, as well as the quality of the product, i.e. concerning dimensional stability and other quality specifications.

Other substitution factors include cultural preferences, strength, ability to meet fire and other code requirements, durability, appearance, and perceived value. For applications where design professionals such as architects and engineers are involved, the degree to which they have been educated in the use and design of materials is an important factor.

Some consumers are willing to pay more for products that are easy on the environment, but more often, consumers expect materials to meet environmental criteria and are not willing to pay more. However, when two products are similar in cost, arguments of environmental superiority may become a factor in selection.

Chapter 10 - Consumers Awareness of Environmental Issues

Consumer awareness of environmental issues is growing in many parts of the world and consumers increasingly take environmental factors into account in daily decision-making. However, in some cases environmental issues have become more mature and less emotional than when they were emerging issues.

In North America, environmental issues are similar in Canada and the U.S. In the U.S., the conservation of public lands, logging in National Forests, and species protection stemming from the spotted owl controversy are important issues. In Canada, 'old growth' conservation, clear-cut harvesting, and aboriginal affairs are issues that affect the forest industry.
In Europe, since the beginning of the environmental movement in the 1970s, awareness of environmental issues has increased significantly. Environmental activism peaked in Europe around 1992.

**Figure 4:** Is environment an immediate and urgent problem? - Degree of agreement

The foremost environmental issue for Europeans is air and water pollution from manufacturing, but during the last years concern about the forest industry’s raw material procurement has increased dramatically. Each country has particular local environmental issues.

A comparison of the 1992 and the 1995 data of the Eurobarometer surveys shows a general decline in the number of people who are very worried about environmental problems such as ozone layer destruction, disappearance of tropical forests, greenhouse effect, disappearance of animals and plants. For the EU-citizens, the theme ‘environmental protection’ ranked sixth in importance in 1994. Environmental issues have lost ground to other issues such as unemployment and recession.

Several surveys indicate the public places a high level of credibility with environmental organisations concerning environmental-related matters, while foresters are regarded as very credible information sources when people are asked more specifically on information resources concerning forests and the environment. Politicians are not very well regarded as sources of information on environmental issues. The forest industry has a better image than other industries.

Several of the available studies that were conducted in single countries in Europe and in certain of European countries show that wood is regarded to be the most environmentally friendly material compared to other materials. Paper is also well regarded. The following figure represents one of these surveys, being summarised in the complete substitution report.
For several years, Demoskop has conducted surveys with the general public in the Netherlands, Germany and the United Kingdom on behalf of the Finnish Forestry Association, Living Forests Norway and Svensk Skog (Swedish Forest). When asked to choose the environmentally preferable materials from a list, the answers in all three countries are in accordance with each other with one exception. In the UK, aluminium is considered better than concrete in an environmental sense, whereas the opposite is the case in the other two countries.

The complete substitution report, report *The Competitive Climate for Wood Products and Paper Packaging: the Factors Causing Substitution with Emphasis on Environmental Promotions*, also summarises the key outcome of the important study “The attitude of EU-citizens towards forests, forestry and wood”, by E. Rametsteiner together with P. Schwarzbaier, H. Justin, J. Kärnä, M. Becker and T. Kühn (1998). The study compares the environmental friendliness of wood (domestic and tropical) to substitute materials (glass, steel, aluminium and plastic) in the main European markets (Germany, France, Italy and UK).

Although wood and paper products are seen to be environmentally acceptable materials, the public in North America and Europe is concerned about replanting and sustainability of supply.

**Chapter 11 - Government Policy Effects on Substitution**

Governments provide assistance to the forest industry and the competitive industries in various ways. These include subsidies, the dismantling of trade restrictions, and the adoption of less restrictive codes and standards. However, free trade agreements are limiting the extent of subsidies and other types of assistance.

**Chapter 12 - Environmental Organisations’ and Councils’ Effect on Substitution**

Chapter 12 of the complete substitution report, *The Competitive Climate for Wood Products and Paper Packaging: the Factors Causing Substitution with Emphasis on Environmental Promotions*, summarises the make-up and activities of environmental non-governmental organisations (ENGOs) and their activities in the market place and their affect on government policy in North America, Europe and Japan.

The forest industry has been subject to environmental group activism directed mostly at harvesting, particularly in the National Forests of the U.S., and also the harvesting of tropical timber.
In Canada, endangered species legislation, and constraints to logging, particularly in the coastal forests of British Columbia, have been demanded by environmental groups. Aboriginal land claims are linked to these issues.

In western Europe and Scandinavia, protection of 'old growth' forests, and wood imports from Russia and tropical countries are important issues for environmental groups. In addition, environmental campaigns directed at the production and consumption of energy have been gathering momentum.

In 1994, the Worldwide Fund for Nature formed the 'WWF 1995 Group' in the United Kingdom, to link the purchase of timber products to forest management practices and to demand certification. Similar buyers groups and projects are under development in Australia, Denmark, France, Germany, Ireland, Spain, Switzerland, Japan, North America, and Brazil, involving a partnership between environmental groups and industry, mainly retailers, with industry committed to buying products from well-managed forests.

Environmental groups are less active in Asia than in Europe and North America but several Asian organisations are involved in issues such as animal well being or waste management. Decreasing forest area and unsustainable forestry are the main concerns in Asia. Chlorine bleaching is an emerging issue, and the establishment of fast growing forest plantations is strongly opposed by some ENGOs.

Part IV - Market Shares and Trends

Chapter 13 - Construction

Residential construction
The North American residential construction market is an important market for wood products. In Canada and the United States, the number of annual housing starts numbered about 1.5 million in 1997. Several factors could result in loss of market share for forest products: cost competitiveness, perception of designers and specifiers, perception of environmental effects of materials and attitudes of retail distributors. Fluctuating timber prices, environmental pressures and increased efforts on the part of the steel and concrete industries to take a market share away from timber-framing are causing some market erosion, and there are possibilities this could escalate for wood products.

Western Europe is much more diverse in building practices than North America. In some regions of Europe, there is a very high level of wood use and alternate products and building techniques struggle to make inroads. In other areas, wood use is very low. Nevertheless, timber-frame construction is gradually gaining market share.

Wood products had a dominant market share in Sweden for residential construction, then lost it, and has regained it during the past 40 years. The Netherlands has recognised wood as being an environmentally advantageous material and has set targets to encourage a 20 % increase in wood used for timber-frame residential construction.

Commercial construction
Building codes in North America limit the quantity of combustible materials that can be used in commercial buildings. The codes limit the use of structural wood to four stories or less. Despite this, it is estimated 80 % of commercial floor space falls within the capability of wood construction as defined by the building codes. However, the actual market share for wood construction is about 10 %. This large difference between market potential and market share is the result of a better effort on the parts of the steel and concrete industries to educate architects and engineers on the use of their products, and the perceptions of designers about the fire and durability characteristics of wood construction.
In Europe, codes are generally more generous to wood construction for larger buildings. In Austria, for example, glulam beams are being used increasingly for commercial buildings.

Timber bridges
A high proportion of North American highway bridges are in poor condition and in need of repair. This market opportunity presents itself at a time when the proportion of existing and newly constructed timber bridges is declining. New construction techniques and promotion efforts have resulted in some new timber bridges. North American surveys show that wood is perceived to be inferior to concrete and steel in terms of long-term performance despite the fact that de-icing chemicals are causing steel and concrete bridges to fail earlier than expected. Technological advances, such as stress-laminated decks, have not been supported by marketing and technical support efforts to a sufficient degree to move them from the prototype stage to the common-usage stage.

The situation in Europe is typified by the situation in Austria where nearly all railroad and highway bridges are made of steel or reinforced concrete.

Chapter 14 - Windows and Doors
The window and door market in North America is no longer dominated by wood. For windows, PVC is increasing in market share because it offers the low maintenance benefits consumers are seeking with the superior insulating and interior appearance characteristics of wood. The popularity of PVC windows is expected to grow at least until consumers learn that PVC may be difficult to maintain in the long term when weathering has taken place, or until wood windows can provide better protection to weathering. For doors, steel-clad insulated doors dominate the entry door and non-residential markets.

In Europe, wooden windows have lost about 75% of the western European market in the past 20 years. It is estimated that substitution has displaced 1 to 1.5 million m² of the high quality wood needed for windows. The degree of substitution that has taken place varies from country to country, and substitution has come from aluminium and PVC. Wood retains a two thirds market share of the window market in the Nordic Countries.

Chapter 15 - Packaging
Paper products have a 34% share of the packaging market in the world, plastics have a market share of 30%, metal 25%, glass 6% and others 5%. In all countries, foods and beverages are, by far, the largest market for packaging products.

Part V - Promotion and Advertising Activities

Chapter 16 - Environmental Promotion by the Forest Industry
Chapter 16 of the complete report, *The Competitive Climate for Wood Products and Paper Packaging: the Factors Causing Substitution with Emphasis on Environmental Promotions*, shows and describes advertisements and campaigns in North America and some European countries promoting the forest industry. Most messages focus on the environmental nature of wood products, pointing to the renewability of the resource, replanting and harvesting practices, and the low energy requirements for the manufacture of wood products relative to other materials.

Also shown are some advertisements by non-forestry companies that use forest images to portray tranquillity, and perhaps sometimes giving a message that forests should be left untouched.
Chapter 17 - Environmental Promotion by the Plastics Industry

The plastics industry has been very successful in reversing public opinion about the value of plastic products. Facsimiles of some advertisements are provided in chapter 17 of the complete substitution report, *The Competitive Climate for Wood Products and Paper Packaging: the Factors Causing Substitution with Emphasis on Environmental Promotions*. Some advertising focuses on product qualities such as the durability of PVC windows, while other ads focus on the ways that plastics add to quality of life.

Some plastics advertisements advance the environmental performance of plastics by criticising, for example, the harvesting of timber. However, messages from the plastics industry regarding raw materials from nature hide the fact that plastics originate from a non-renewable resource: oil. The main threat to the forest industry is the strong emotional message concerning 'killing trees', 'saving trees' etc. which deflects public scrutiny from the non-renewable nature of plastics.

Chapter 18 - Environmental Promotion by the Steel Industry

The steel industry, particularly in North America and Europe, actively promotes steel products. The steel industry advertising focuses on strength, recyclability, durability, and in the quest for a larger share of residential framing, is critical of timber harvesting.

Facsimiles of some advertisements promoting steel are provided in chapter 18 of the complete substitution report, *The Competitive Climate for Wood Products and Paper Packaging: the Factors Causing Substitution with Emphasis on Environmental Promotions*. Several messages attack the forests. While the recycling rate for steel is a positive feature, it is also used to distract attention from the fact that steel comes from a non-renewable source, and requires a lot of energy to manufacture.

Steel, like plastics, has used strong emotional messages concerning 'killing trees', 'saving trees' etc. to divert attention from its own environmental weaknesses.

Chapter 19 - Environmental Promotion by the Concrete Industry

This chapter of the report describes advertisements and campaigns in North America and some European countries for the promotion of the concrete industry. Only one message attacks the forests, telling consumers to leave the valuable forests untouched, arguing that they are too valuable to use.

Part VI - Conclusions and Recommendations

Chapter 20 - Conclusions and Recommendations

The forests of the world provide a host of benefits both economical, ecological, social and cultural. Products coming from the forests play a crucial role in housing the booming world population and other human needs.

Sustainable production of goods and services from forests must include associated benefits for which society is placing increasing importance, such as biological diversity, tourism, recreation, wilderness areas, etc. At the same time, forest products are competing in a global economy with other substitute materials.

All resource industries are scrambling to position themselves to be seen in terms of environmental friendliness. There are not yet globally approved standards that allow a fair comparison between materials.
Wood products have a definite advantage over competing products because wood products are renewable. In addition, although the manufacture of all building and packaging products has environmental effects, many studies show that wood has very low energy requirements for manufacture, and low pollution effects compared to materials coming from petroleum products and from mined resources.

Cost is a key factor for substitution of forest products. As wood and wood fibre increase in cost, or are perceived to increase in cost compared to competing materials, market share is lost. Sometimes, it is not the purchase cost alone that determines this. For example, wood siding may be cheaper initially than brick, but is seen to have a higher maintenance cost over the service life which makes it more expensive in the long term.

In addition, the level of marketing efforts and research and development investments may affect substitution. Compared to the plastic and the steel industries, the wood industry spends about 4% as much as the others to educate the public about its products. Also, the wood industry seems to need to improve its ability to meet requirements from the customers and to create new markets to avoid substitution and win market shares.

The forest and the forest industries sector is more diversified than competing industries, which makes it difficult to organise effective promotional campaigns. This is one reason why the forest industry is being outspent by competing products.

Consumers have not shown a lot of interest in paying more for environmentally superior products but rather expect environmentally beneficial products to be comparable in cost. However, as costs for competing materials approach equality, consumers may be swayed by perceived environmental benefits.

There appear to be similar issues and responses in North America, Europe and Asia.

The Co-chairman’s report of the Intergovernmental Panel of Forests of the UN Commission for Sustainable Development (1997), underlines the need for actions towards the promotion of wood as an environmentally friendly material. The Panel called upon relevant organisations “to support efforts to gather more information and conduct more independent market and economic studies of potential competition between wood and non-wood substitutes, analysing the costs and benefits, including any substitution effects, and the overall impact on the management, conservation and sustainable development of all types of forests”.

At the Third Ministerial Conference on the Protection of Forests in Europe, held in Lisbon in June 1998, the ministers responsible for forests in the Pan-European region committed in the general declaration to “taking action to stimulate and promote the sound use of wood and other forest based products as environmentally friendly and renewable resources”.

From these high level initiatives and the conclusions above, the following recommendations of the Substitution Subgroup of the Joint FAO/ECE Team of Public Relations Specialists in the Forest and Forest Industries Sector should be followed by actions as soon as possible:

- Reinforce the network between organisations and countries which has been strengthened as a result of the Substitution Project;

- Increase the international co-operation and communication within the forest and the forest industries sector by organising the International Forestry Communications Forum. The main target group should be the communicators of the forest and forest industries sector in Europe and North America;

- Prepare and run co-ordinated national educational campaigns to explain the importance of forest products and stimulate and promote the sound use of wood and other forest-based products as environmentally friendly and renewable materials;
• Make further studies on the promotion actions taken by the industries of the competing materials, especially in Europe and Japan;

• Support international co-operation to recognise the strength of the forest industry’s environmental position in the context of global climate change, due to the sequestration of carbon dioxide during wood growth, energy efficiency of production, and recycling and energy recovery of discarded products;

• Increase the general understanding and awareness among the forest and the forest industries sector that there is an urgent need for international co-operation and actions to be taken place regarding the competing materials.

These actions should be planned in a 5 to 8 year perspective and be linked to the activities of the Pan-European Process on the Protection of Forests, the Montreal process, the follow-up of the UN Intergovernmental Panel on Forests and the Intergovernmental Forum on Forests and other relevant international and regional arenas concerned about sound use of wood and other forest based products as environmentally friendly and renewable materials.

The FAO/ECE Team of Public Relations Specialists in the Forest and the Forest Industries Sector could play an active role in implementing these recommendations, in close contact with the FAO European Forestry Commission and the UN-ECE Timber Committee.

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