Re-Source: Market Alternatives to Ancient Forest Destruction is the second in a series of Greenpeace reports aimed at the corporate consumers of forest products to help them end their role in ancient forest destruction. The first report, Buying Destruction: A Greenpeace report for corporate consumers of forest products, released in August 1999, profiles major logging and wood trading companies active in the remaining ancient forests of Brazil, Cameroon, Canada, Chile, Gabon, Guyana, Indonesia, Papua New Guinea, Solomon Islands and Russia.

Greenpeace believes that individual and corporate consumers have the right and a responsibility to choose wood and wood-based products which do not contribute to environmental and social degradation.

Re-Source focuses further on how corporate consumers can find viable alternatives to ancient forest destruction. Alternative approaches include the development of good purchasing policies (to avoid a situation where ancient forest products are simply replaced by other ancient forest products), efficient ('clever') wood use, adoption of the precautionary principle (the development of measures which reduce wood use in the future), etc. Most of the products described in this report are readily available in the marketplace, though not yet in every country. Some alternatives discussed are not yet available on a significant scale; these are included where their potential seems particularly promising.

This report is divided into three main parts. Part 1 explains the background to the need to promote market acceptance of alternatives to ancient forest products, and describes the main approaches to developing these alternatives. Part 2 elaborates on timber and wood-based panels, with emphasis on wood use in the construction sector. Ancient forest free alternatives for office and printing paper and newsprint are described in Part 3.

Greenpeace International, November 1999
Contents

Foreword 1
IKEA Statement 3
Abbreviations 4
Summary 5

Part 1 - Introducing alternatives 9
1.1 A call to save the Earth’s ancient forests 10
1.2 Greenpeace’s vision 13
1.3 Market commitments to reduce pressure on ancient forests 14
1.4 Fulfilling commitments to reduce pressure on ancient forests 16
1.5 The impacts of corporate commitments 17
1.6 Alternatives to ancient forest products: the main approaches 20

Part 2 - Timber and wood-based panels 21
2.1 Ancient forest timber and plywood product consumption 22
2.2 Building without ancient forest timber 22
2.3 Panel products 27
2.4 Wood processing technologies 30
2.5 FSC-certified timber 32

Part 3 - Paper 33
3.1 Ancient forest pulp and paper consumption 34
3.2 Pulp and carbon emissions 35
3.3 Office papers 35
3.4 Printing papers 39
3.5 Newsprint 40
3.6 Tree-free papers 42

Further Reading 45
Useful Contacts 45
Sources 46
IKEA's policy on the wood used in its products

IKEA's long-term goal is to ensure that all wood products in the IKEA range originate from verified well managed forests.

The first step in achieving this goal will be to require all suppliers to Ikea of solid wood products to fulfil the following minimum requirements:

• The timber used must be produced in compliance with current laws and forest practice codes in the country concerned.

• The timber used must not be taken from ancient forests or other high conservation value forests, unless the forest area is certified according to the Forest Stewardship Council's principles and criteria or equivalent system.

IKEA will notify all its suppliers of this purchasing requirement and will require implementation by 1st September 2000 at the latest.

The second step in achieving this goal will be to extend the above requirements to suppliers of other wood products. This process will start at the latest by 2001.

In order to verify achievement of the above steps, IKEA will establish a system that allows it to trace wood in its products back to specific forest management units.

IKEA will encourage its suppliers to source their wood from FSC certified forestry operations.

Notes
Maps of ancient forests exist in various levels of detail, depending on the ancient forest region. IKEA will provide its suppliers with forest maps developed by Global Forest Watch and Greenpeace. As more detailed maps of ancient forests become available, suppliers will be able to revise their supply areas accordingly.

Ancient forests are those forests that have been shaped largely by natural events and which are little impacted by human activities.

High conservation value forests are defined by the Forest Stewardship Council as those that possess one or more of the following attributes:

• forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia); and/or large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.

• forest areas that are in or contain rare, threatened or endangered ecosystems, forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control)

• forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health) and/or critical to local communities’ traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>Agri-fibres</td>
<td>Agricultural fibre residues (e.g. straw)</td>
</tr>
<tr>
<td>DETR</td>
<td>Department for the Environment, Transport and the Regions</td>
</tr>
<tr>
<td>DIY</td>
<td>Do It Yourself</td>
</tr>
<tr>
<td>FC</td>
<td>Film-Coated</td>
</tr>
<tr>
<td>FSC</td>
<td>Forest Stewardship Council</td>
</tr>
<tr>
<td>GLULAM</td>
<td>Glued Laminated Timber</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organisation</td>
</tr>
<tr>
<td>LVL</td>
<td>Laminated Veneer Timber</td>
</tr>
<tr>
<td>M³</td>
<td>Cubic Metres</td>
</tr>
<tr>
<td>MDF</td>
<td>Medium Density Fibreboard</td>
</tr>
<tr>
<td>NRDC</td>
<td>Natural Resources Defense Council</td>
</tr>
<tr>
<td>OSB</td>
<td>Oriented Strand Board</td>
</tr>
<tr>
<td>PLATO</td>
<td>Providing Lasting Advanced Timber Options</td>
</tr>
<tr>
<td>PPPY</td>
<td>Per Person Per Year</td>
</tr>
<tr>
<td>PVC</td>
<td>PolyVinyl Chloride</td>
</tr>
<tr>
<td>Purlin</td>
<td>A horizontal beam that provides intermediate support for the common rafters of a roof construction</td>
</tr>
<tr>
<td>PSL</td>
<td>Parallam Strand Timber</td>
</tr>
<tr>
<td>RCF</td>
<td>ReCycled Fibre</td>
</tr>
<tr>
<td>WRI</td>
<td>World Resources Institute</td>
</tr>
<tr>
<td>WWF</td>
<td>World Wide Fund for Nature</td>
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</table>
NEED TO PROTECT THE ANCIENT FORESTS

Ancient forests are one of the earth’s most precious natural treasures. The world’s last remaining ancient forests - in the Amazon, Canada and Russia among other countries - have developed over thousands, if not millions of years, and nurture ecological and climate processes upon which biodiversity and human life depend.

Around 80% of the world’s original ancient forests have already been destroyed or degraded - and 39% of what remains is under threat, mostly from logging to satisfy global demand for paper and timber. The principal markets for these products are in North America, Europe and Japan, which together consume over half of the world’s industrial timber and over two-thirds of its paper. Demand is growing: by 2010, the amount of industrial roundwood extracted from the world’s forests is expected to increase by 26% compared to 1995 levels.

RE-SOURCING AWAY FROM ANCIENT FORESTS

A growing choice of alternatives

Replacements already exist for virtually every application of wood from ancient forests - from building construction to product packaging. Many alternative approaches or products are recent arrivals on the market, yet technological advances, environmental pressures and government intervention are ensuring that the sophistication and range of alternative products is likely to grow in coming years.

A long list of leading companies in Europe and the USA have already responded to consumer pressure or concerns about ancient forest destruction: Sweden’s IKEA Group, UK’s Meyer International (largest timber importer and trader) and B & Q; Germany’s OBI and Praktiker, and the USA’s Home Depot, Union Carbide Corporation, Kimberly-Clark, 3M, IBM and Hallmark Cards.

Corporate commitments to reduce pressure on ancient forests

Companies such as B & Q and IKEA have developed integrated wood purchasing policies, which involve setting specific targets for phasing out harmful supplies, continuous monitoring of progress and establishing partnerships with environmental groups.

Other companies have joined forces to achieve similar goals - the Recycled Paper Coalition in the USA is one example. Worldwide, there are now 16 Forest Stewardship Council (FSC) Buyers’ Groups established to promote the trade and consumption of forest products from independently certified forestry operations.

Corporate commitments can have a significant impact on demand for ancient forest products: in Germany, the UK and the Netherlands, tropical timber consumption dropped by 36% between 1992 and 1996.
Alternatives to ancient forest products encompass not just other products, but a wide range of approaches, which can be categorised as the 5 Rs:

1 Replace ancient forest products
2 Recycle and use recycled products
3 Re-use wood
4 Reduce wood and paper consumption
5 Re-think wood use

**ALTERNATIVES TO TIMBER FROM ANCIENT FORESTS**

Family housing and office construction are the most important uses of ancient forest timber. Building without ancient forest timber involves:

- Designing to extend the lifespan of a building
- Rethinking the way wood is used in construction; for instance by adopting high posted timber frames, or by using alternative materials such as straw-bales, adobe clay or rammed earth.
- Re-using timber and using recycled timber. A growing number of companies in the USA are selling salvaged timber, which has ‘antique’ decorative value. ‘Harvesting’ sunken logs is an option which several companies are pursuing.
- Reducing the need for new timber in future. Companies such as Proctor & Gamble, Kellogg’s and Nestle in the UK are replacing wooden pallets with recycleable cardboard versions.
- Use of engineered wood products such as GLULAM, Laminated Veneer Timber (LVL), I-joists and Parallam. Engineered wood products increase the opportunities for using small diameter logs from second growth forests and plantations, and even recycled timber and plywood. In the USA, engineered wood products saved the use of 23 million m³ of roundwood in 1993.

**Timber panels**

- The use of alternatives such as Medium Density Fibreboard (MDF), bamboo, non-wood fibres like wheat straw and soybean stalks, is already occurring. The Canadian company CanFibre, is producing MDF made entirely from 100% recycled waste wood fibre, without urea formaldehyde resins.
- In response to a number of Hollywood film companies, pledge to phase out the use of tropical hardwood plywood boards in film sets, Simplex Products designed an 85% recycled replacement called ‘Studio Board’.

**Wood processing**

Techniques such as star-sawing and turning soft-woods into hardwoods (e.g. PLATO and acetylation) are promising developments.

**ALTERNATIVES TO PAPER FROM ANCIENT FORESTS**

The bulk of ancient forest pulp and paper in the world is produced in Canada; most is consumed in the USA. Printing and writing paper (including office paper) and newsprint - which together account for 41% of world paper consumption - are the most important sector in terms of ancient forest use.
Office papers
Companies can reduce paper consumption by 20% by ‘good housekeeping’ - e.g. double-sided copying and lighter-weight papers - and by up to 50% by changing systems, e.g. introducing electronic communications.

Examples of companies which have cut paper consumption include Osaka Gas in Japan and the US communications giant AT&T, which has saved 21 million sheets of paper each year by introducing a range of paperless billing schemes.

Recycled office papers are meeting higher than ever performance criteria. Companies such as UK Paper are taking advantage of large waste paper resources in the ‘urban forests’ of large cities to produce high quality, recycled office papers.

Governments can set an example and speed the growth of markets by setting targets for their own recycled paper use. In 1998, virtually all paper used by the German government was recycled.

Printing paper
Use of paper for magazines, direct mail, junk mail and other corporate mailings is increasing much faster than the average growth for all other types of paper, and has a low recycled content. New technologies in paper manufacturing - such as processes used by Germany’s Haindl Papier - offer the potential to significantly improve recycled content.

Newsprint accounts for around 13% of global paper use. It is possible to recycle newsprint five times with little change in fibre quality. Yet the average recycled content of newspapers in Western Europe was 55.8% in 1997, and in the USA it was only 28%.

US states are setting targets to improve this percentage, and individual companies are already achieving far higher performances. The recycled content of Switzerland’s largest newspaper, Blick, was 85% in 1997.

Tree-free papers
Around 7% of all paper worldwide are derived from fibres other than trees. These include straw, sugar cane waste (‘bagasse’), bamboo, kenaf, hemp, flax, cloth and jute. While most of tree-free papers are produced in China, companies like Crane Co. in the USA has been printing on cotton rag pulp for 100 years, and even makes paper from old blue jeans.

Tree-free paper production has not received the research and development focus of wood-pulp, but clean production pulping technologies offers significant environmental benefits, and in some cases (such as straw) the potential is there to make paper cheaper.
PART 1

introducing alternatives
1.1 A CALL TO SAVE THE EARTH'S ANCIENT FORESTS

Russia, Canada, Alaska, the Amazon, Papua New Guinea and the Congo Basin hold the earth's last large tracts of unlogged natural ancient forests. The magnificent forests in these regions - ancient forests\(^1\) - evolved during thousands, in some cases millions, of years.

Ancient forests are one of the earth's most precious natural assets. In these forests, natural ecological and evolutionary processes take place which maintain and generate the biodiversity upon which mankind relies. Ancient forests contribute a large portion of ecological services - such as watershed protection and climate stabilization - which make the planet habitable. And they are home to many of the world's remaining indigenous peoples.

With around 80% of the earth's original ancient forests either destroyed or degraded, there is an urgent need to maintain the remaining large areas of ancient forests as intact as they are today. Yet the World Resources Institute (WRI) estimates that some 39% of what remains as ancient forest worldwide are already threatened. While outside of the boreal forest regions around 75% of these forests are under immediate threat. Over half a billion hectares of ancient forest worldwide are likely to be logged, mined, cleared for farms and/or opened up by roads in the foreseeable future if nothing is done to stop it. By far the biggest single threat, according to WRI, is from logging\(^2\).

Each year, millions of hectares of ancient forest are logged by the forest industry (Figure 1.1). Much of this activity is driven by the demand for paper, timber and other wood products in the markets of North America, Europe and Japan. Whereas the population in these three markets represents only one-fifth of the world population, they consume over half of the world's industrial timber and more than two-thirds of its paper and paperboard\(^4\).

Some forest product markets rely heavily on ancient forests. In 1996, approximately 23.5 million cubic metres (m\(^3\)) of coniferous softwood from Canada's ancient forests was used in residential construction, repair and remodelling in the USA: 20% of all softwood used in this sector\(^5\). The average American citizen consumes three times as much Canadian sawnwood as a Canadian citizen.

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1 Ancient forest are defined here as the world's remaining forests which have been shaped largely by natural events and which are little impacted by human activities.
3 Sources: Figure for Canada is average logging rate in old growth forest in 1990s from May 1998 (based on Environment Canada); the figure for Russia probably represents a gross underestimate. According to the World Watch Institute (1998): 'It is estimated that as many as 12 million hectares are illegally logged each year, compared to only 2 million hectares of legal logging by official estimates'. The figure calculated here is based on the official estimates, divided by Wood Resources International's (1996) estimate that 76% of Russia's pulp mills process pulpwood from original forest. The figures for the tropics (newly logged forests) are derived from FAO data (1981-1990). Due to illegal unmonitored logging activity, the estimated area logged is likely to be higher.
5 In 1996, the US residential sector consumed 118 million m\(^3\) of coniferous softwood. Canada supplied 43 million m\(^3\) of sawn softwood to the United States in the same year (FAO 1997). Assuming that 55% of this imported volume was used by the US construction sector and assuming that that 90% of this volume was from ancient forests, some 23.5 million m\(^3\) (20% of total consumption) Canadian ancient forest softwood was used.
Although the international tropical timber trade represents only 15% of the global forest products trade, the Food and Agriculture Organisation (FAO) estimates that 83% of all logging in the tropics takes place in forests which have never before been exploited. Tropical timbers traded internationally are especially likely to originate from ancient forests. Even paper is made from ancient forests. Of all wood (pulpwood) consumed by the paper industry worldwide, 17% comes from ancient forests, mostly the boreal forests and temperate rainforests of Canada.

Today, international trade and investments allow the forestry sector to move into the remotest parts of the world to harvest logs for ever more demanding markets in the developed world. This is a dangerous situation: markets do not experience the impacts of destructive logging which the forest areas exploited for these markets suffer. Instead, the major wood consuming markets - Japan, the USA and Europe - tend to source wood supplies from other unlogged ancient forests.

Figure 1.2 illustrates how Japan's tropical log sources have gradually changed through time - from the Philippines, to Sabah and Indonesia, to Sarawak as region after region is first heavily exploited, and then depleted of harvestable areas. Similarly, the closing down of logging on State Forest Land in the Pacific Northwest of the United States has led to a shift to other sources: Canada, South-East USA, Chile and in future possibly the Russian Far East.

Today, Malaysian logging companies are now active in every tropical continent today, controlling extensive ancient forest concessions. In 1998, the Malaysian logging company Rimbunan Hijau recently entered the temperate ancient forests of the Russian Far East. After having exploited West Africa's forest resources, Europe's interests in Central Africa were enforced. European companies, such as Danzer, De Colvenaere, Alpicam and Isoroy, control millions of hectares of ancient forest in Congo Brazzaville, Cameroon and Gabon. Canadian, American and Japanese companies have secured logging rights for millions of hectares of Canada's boreal forests. American companies, Manhattan Mining and Sara Hallitex, entered the rainforest logging industry in Brazil as recently as 1998, thereby becoming - through their subsidiaries - the exploiters of well over half a million hectares of Brazilian rainforest.

Wood shortages and the loss of ancient forest may not be felt in the market; the impacts are felt where the forest resource has been depleted. As well as the loss of forest habitat or degradation, people are intimidated, jailed or worse for their

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6 FAO 1993.
8 Contrary to what the figure may suggest, Japan's overall tropical timber imports from the South Seas did not decrease as processed forest products (such as sawn timber, plywood and finished products) also replaced log imports. However, with depletion of forest resources, the transfer of imports from one country to another still takes place.
10 Fuelwood and charcoal production grew even faster in this period, i.e. by 67% between 1965 and 1995. Although the production of fuelwood and charcoal does affect forest cover in various parts of the world, it is not generally believed to be a major factor in ancient forest loss.
12 FAO 1999
efforts to save the last forests from the axe in many parts of the world. Former exporters, like the Philippines, Thailand, India and Nigeria, now need to import wood, thereby depressing national income.

In the meantime, global demand for forest products continues to grow. In the last 30 years, the forestry sector has kept up with demand by increasing industrial roundwood production by 32%\(^\text{10}\). In 1995, it had reached almost 1.6 billion cubic metres, a level unprecedented in history\(^\text{11}\), and projections for the increase in demand from 1995 to 2010 is estimated at 26%\(^\text{12}\).

Figure 1.3 provides closer insight in the expected growth in supply for industrial wood and its main sources. Logs and pulpwod supplies from fast growing plantations will become more important, but the bulk of supply will continue to be derived from slow growing natural forests (currently supplying 70% of pulpwod supplies).

A historic analysis by John Perlin shows that, through the ages, civilisations have repeatedly invented numerous timber-saving techniques. Unfortunately, these alternatives were introduced only after most regional forest resources had been depleted and destroyed\(^\text{13}\). Wood markets need to make a leap forward to a situation where it is accepted that the earth’s ancient forests are completely off bounds for poor forestry practices, if these forests are to be kept as intact as they are today. A number of trends are already at work, stimulating the development and market introduction of alternatives to ancient forest products (Box 1.1).

This report demonstrates that many alternatives are already available on the market today, however there is a great need to speed up adoption of these alternatives in the marketplace. Indeed, many wood users in Europe, North America and Japan have already developed a sense of urgency and phased out their use of ancient forest products. Still, much more remains to be done.

1.2 GREENPEACE’S GOAL

Greenpeace believes that the earth’s last ancient forests should remain as intact as they are now, allowing them to fulfil their essential biological, environmental, social and non-timber economic functions - upon which mankind depends - now and in the future. Ancient forests should not continue to be viewed as a resource reservoir for industrialised societies. Ending destructive logging practices in ancient forests throughout the world is a major priority for Greenpeace.

Forest products from well managed secondary forests and plantations, as well as a range of widely available recycled wood and non-wood products, can already replace most ancient forest products. To achieve this, Greenpeace’s goal is to reduce pressure on ancient forests by:

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Box 1.1  Trends driving the forestry sector and wood user markets towards alternatives

PUSH FACTORS

Withdrawal of, or reduction in, cutting rights: Excessive decline of ancient forests in forest regions will increasingly force governments to adopt logging bans or drastically reduce cutting rights. Such policies have already been adopted in the USA Pacific Northwest, the Philippines, China, Bolivia, New Zealand and Thailand.

Past over-cutting and alternative land use: At current rates of deforestation, over 200 million hectares of forest will be lost between 1995 and 2010. A similar area will probably be affected by logging activity. Excessive damage to the forest hampers regeneration and prompts governments to release ‘permanent forest’ for conservation, thereby effectively reducing the forest area available for roundwood production.

Increasing costs of infrastructure: As logging activities penetrate deeper into remote forest areas, the cost of infrastructure – roads, sawmills, transportation, labour, etc. – is likely to increase log prices.

Government regulations limiting landfill and incineration: Environmental and economic costs will continue to stimulate governments to impose restrictions on the landfilling and incineration of paper and timber products.

Environmental campaigns and public opinion: Public pressure will continue to be a major incentive for wood users to stop buying or using ancient forest products. As David Crabtree from Express Newspapers plc, London, puts it: “Public relations experts all tell us that any company or industry associated with or considered to be associated with the destruction of the rainforests has a PR disaster on their hands.” A recent poll conducted by Yankelovich Partners in the USA found that 62.2% of the American respondents felt that companies today should not use or sell products made from old growth wood.

PULL FACTORS

Plantation and secondary forest area increasing: A number of fast growing plantations in Brazil and Indonesia will provide a major chunk of the virgin fibre requirements of the paper industry in the future. Increasing areas of secondary forest will also replace ancient forest logs by providing the raw material for engineered wood products.

Availability of alternative fibres: Agri-residues, and the technologies required for their use, are becoming available for the production of tree-free paper and panels.

Improved quality of recycled products: the quality of recycled paper products has already been significantly improved by technological improvements, creating a higher demand for waste paper which will improve recycling rates.

Cheap fibres: in Europe and the USA, salvaged lumber, recycled paper and agri-residues currently provide a cheap alternative fibre source. However, as demand is increasing, price increases should be expected.

New technology: wood engineering technology already allows the forestry industry to use small diameter logs from plantations or second growth forests, while making products of a quality comparable to or better than those from ancient forests.

Public opinion: producers, retailers and wood users avoiding ancient forest products as an element of a wider environmental policy enjoy a better public image. Companies with good environmental management bring about gains in productivity and market share, better business relationships and lower cost of capital.
• Creating awareness among wood users, governments, forestry companies and other key players of the urgent need to stop destructive activities in the earth’s last ancient forests.

• Challenging companies to stop destructive practices and adopt ecologically forest management practices and seek independently certified according to Forest Stewardship Council standards.

• Promoting active protection strategies for ancient forests taken out of timber production, including recognition of forest areas as World Heritage Sites and development of non-timber forest products.

• Exploring and encouraging environmentally friendly alternatives for ancient forest products in the marketplace, especially in the USA, Japan and Europe.

• Promoting wood-use efficiency in consumer markets and by corporate consumers.

1.3 MARKET COMMITMENTS TO REDUCE PRESSURE ON ANCIENT FORESTS

Project developers, retailers, architects, printers, publishers, private sector and government offices and, of course, individuals are all wood consumers. Alternatives for virtually all uses of ancient forest products exist in construction, decoration, writing, printing and packaging, in the USA, Europe and Japan. An increasing number of additional alternative products are expected to enter the marketplace in the near future.

But some alternatives are only now becoming available on the market, such as wood from certified forestry operations, salvaged lumber and high quality recycled office paper. This is partly the result of market and environmental incentives led by consumer demand and environmental pressures. These are some examples from Europe and the United States:

United Kingdom

• In 1997 B & Q, Britain’s largest DIY (do-it-yourself) chainstore, announced its decision to cease buying hemlock from British Columbia, as it was “very uncomfortable with clearcutting and there had been no move towards Forest Stewardship Council (FSC) certification”. B & Q has switched its hemlock supplies to FSC-certified pine15.

• The UK’s fourth largest DIY chain, Magnet Stores, cancelled a future timber contract with Doman, a company that is logging in the Canadian Great Bear Rainforest16.

• In early March 1998, DIY chain Do It All released a statement saying that it was “very concerned about the issue of the Great Bear Rainforest” in British Columbia, Canada and that it would be “unable to source Forest Stewardship Council (FSC)-certified hemlock from Canada in the foreseeable future”. Do It All decided to replace the hemlock with FSC-certified pine17.

• In January 1998, Sainsbury’s Homebase announced its decision to source beech for one of its product range in order to “avoid British Columbia hemlock”18.

• In a letter to one of its paper suppliers, BBC Worldwide Publishing wrote: “BBC magazines has already made its decision: we are committed to producing our magazines in an environmentally responsible manner and we have decided that in future we shall not purchase paper that contains pulp from this area [the Great Bear Rainforest]”19. The letter was sent to one of the major paper importers of chemical pulp from British Columbia, Haindl Papier, based in Germany. Haindl, which is a supplier to a number of major magazine publishers, including BBC magazines, Time International and Der Spiegel, had bought 5-10,000 tonnes of pulp from Doman, a company that is logging in the Great Bear Rainforest. It has since stopped buying from Doman and is supplying BBC magazines with paper made from Scandinavian pulp.

16 Op cit.
17 Op cit.
18 Op cit.
19 Op cit.
Germany
• In the early 1990s, Germany’s largest DIY chains - OBI and Praktiker - announced they would stop selling tropical timber, unless it came from FSC-certified forests. Germany’s largest DIY chains, construction companies and publishing houses are turning away from purchases of British Columbian forest products.
• All members of the German Publishers Association, which includes Der Spiegel and Springer Verlag, have decided that they will not buy pulp from tropical rainforests. They also refuse pulp from ancient forests in Mid- and Northern Europe.
• Otto-Versand was the first mail order company in Germany to refrain from using tropical timber in its product range.

The Netherlands
• In 1993, the Netherlands’s largest DIY chain, Intergamma (Gamma and Karwei) declared it was phasing out tropical timber purchases and introducing FSC-certified timber instead. Intergamma’s suppliers supported this goal and proposed applying this policy to all timber products. The country’s second largest DIY store, Praxis, soon followed suit.
• In 1997, six paper companies - representing two-thirds of paper imports from Finland - signed a declaration in which they requested that their suppliers refrain from logging ancient forests and purchasing products from such forests. The signatories included Bührman Ubbens, the largest paper wholesaler in the Netherlands, and Roto Smeets de Boer, the largest printing company.
• By 1996, approximately one-third of the Dutch timber market, including 72 project developers (including the largest in the country, Bouwfonds) and 140 building corporations, had signed letters of intent outlining their commitment to phase out tropical timber, unless it is sourced from FSC-certified forests. Furthermore, 250 municipalities and six provinces have adopted this policy.

Belgium
• In 1998, all members of the Belgian Timber Trade Federation pledged to stop buying forest products from logging operations in the Great Bear Rainforest in British Columbia. In addition the Federation agreed it would only renew purchases when they had achieved independent certification, according to FSC standards.
• The European division of the Union Carbide Corporation, based in Belgium, informed Greenpeace in a letter dated 8 April 1998 that: “Union Carbide shall be placing no further orders for pulp from the coastal temperate rainforest area of British Columbia. This action is due to our interest in preserving old growth rainforests.”

Austria
• In February 1998, Lenzing AG, a major Austrian pulp buyer, cancelled its contracts with Doman. Echoing the sentiments of many companies, Ludwig Promberger, Head of the Board of Lenzing AG, stated: “The environmental awareness of European consumers makes it impossible to market a new product containing fibres from British Columbia’s ancient rainforests. Once we learned about the problems, we tried hard to substitute with fibres that get ecological approval.” Lenzing has since moved to a supplier which produces pulp from plantations.

Finland and Sweden
• Following the developments in the timber and paper markets in Western Europe, the Scandinavian logging companies ENSO (now Störa-Enso), Vapo Kuhmo, Polkky and Heikki Kokkoneni from Finland, MoDo from Sweden and Systamator have joined a moratorium on logging ancient forests in the Karelian Republic and Murmansk Region in Russia.

21 Greenpeace USA 1998.
22 Pressemitteilung Verband Deutscher Zeitschriftenverlage (VDZ) 1996.
24 Pers. comm. Friends of the Earth Netherlands, as received 4 November 1998.
Swedish largest logging companies, Assi Doman, Stora (now Stora-Enso), SCA and others, have pledged not to log areas which contain ancient forests within their own forest lands nor to purchase products from such forests. This is part of the regional standard for the FSC in Sweden.

United States

In August 1999, Arthur Blank, the Chief Executive of the world’s largest timber retailer Home Depot, pledged to eliminate from its stores wood products from “environmentally sensitive areas.” He said that Home Depot was taking “its responsibility as a global leader to help protect endangered forests” and that the company was big enough to “move the needle on this.”27

Kimberly-Clark scaled back its use of rainforest wood fibre from British Columbia after Rainforest Action Network published adverts depicting ancient forests with the headline “Oldest living things on earth or tomorrow’s toilet paper?”


1.4 FULFILLING COMMITMENTS TO REDUCE PRESSURE ON ANCIENT FORESTS

Purchasing policies

When timber supply contracts with logging companies in one area of ancient forest are merely replaced by contracts with other companies active in ancient forests, the overall benefit for the forests is zero. Companies like Britain’s B&Q have achieved progress in reducing their pressure on ancient forests by developing integrated wood purchasing policies. These policies often contain the following elements29:

- Assessment of supply chain such that all forest products sold can be traced back to a particular forest, and an internal assessment is made about the quality of the forest management in that forest.
- Ambitious and specific targets are set (such as deadlines to phase in FSC wood products).
- A problem assessment is carried out, i.e. an inventory of wood product sources and environmental commitment of suppliers.
- The targets are valid for all (forest) products purchased and sold by the company.
- Incentives are put in place to motivate suppliers and others involved. They may include commitments to paying higher prices, but also bold choices to cancel contracts with unco-operative suppliers.
- Investments are made to attract expertise and to conduct research.
- Progress is continuously monitored.
- Experiments with new suppliers and products are carried out.
- Suppliers, clients and the general public are frequently informed about progress made.
- Partnerships with environmental groups are established.

29 B&Q 1995, provides detailed insight into the way B&Q developed the initial stages of its timber purchasing policy.
Group commitments

Not all companies are in a position to overhaul their timber and paper purchasing practices completely by themselves. A number of companies in the USA, Europe and Japan have therefore set up voluntary groups to join forces in their commitments to reduce wood consumption and promote recycling, and/or to source certified forest products. Box 1.1 provides one example, the Recycled Paper Coalition in the United States. Ad hoc and long-term alliances are also built with environmental organisations, such as WWF, Friends of the Earth, NRDC and Greenpeace. These organisations have often been involved right from the conception of these groups. The alliances bring about obvious benefits: efficient use of resources (staff, funds and expertise), more consistency in targets and methods and a greater clout.

There are now 16 FSC-Buyers Groups established worldwide to promote the trade and consumption of forest products from well managed forestry operations, independently certified by auditors accredited by the Forest Stewardship Council (FSC). Buyers Groups are active in Australia, Austria, Belgium, Brazil, Denmark, France, Germany, Ireland, Japan, the Netherlands, Norway, Spain, the United Kingdom, the United States, Sweden and Switzerland. These groups have played a major role in the rapid development of forest certification. The corporate members of the British 1995+ group represent over 20% of total UK roundwood consumption, worth over US$4.5 billion per year on product turnover.

1.5 THE IMPACTS OF CORPORATE COMMITMENTS

How do corporate commitments help save or reduce the pressure on ancient forests? A schematic summary of how new wood use policies can lead to changes in the forest is presented in Figure 1.4.

Wood users may choose to reduce wood consumption, for instance through purchasing recycled products or by reducing their overall use of timber or paper (other general approaches will be discussed later). Some wood users will choose to work with their suppliers to find alternatives, such as forest products from well managed certified operations. In all cases, the commitment reduces demand for ancient forest products and this, in turn, causes loss of revenue for ancient forest logging companies. Tropical timber consumption in Germany, the United Kingdom, and the Netherlands, for example, dropped by 36% between 1992 and 1996. Malaysian forestry

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Box 1.1 Recycled Paper Coalition (RPC)

The Recycled Paper Coalition (RPC) in the United States is a voluntary organisation of paper users whose objective is to conserve natural resources and to reduce waste by purchasing environmentally-preferred products, by maximising the efficient use of paper, and by recycling used paper. RPC members bring purchasing strength to the recycled paper market by demonstrating demand for recycled products, especially those made from post-consumer materials, with the aim of sending the signal that additional industry investment is warranted to increase the supply of recycled paper, increase the quality of recycled paper and increase recycling rates.

RPC’s membership increased five-fold between 1992 and 1997. There are now over 250 members, mostly end users of paper products from the private and public sectors. RPC’s membership includes Bank of America, Chevron Corporation and Hewlett-Packard Company.

In 1997, the RPC achieved the following goals:

- At least 50% of paper purchases by members were to contain a post-consumer content (PCC) of 20% or higher. Members surpassed that goal, with 72% of all reported paper purchases containing at least 20% PCC.
- Of recycled paper product purchases, end users reported an average PCC of 30% compared to the Board’s goal of 25%.

In comparison with the commitments made by the German Government, these are very modest goals.

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companies, in particular, were hard hit by losing this high-value export market share.

What happens when logging companies lose their markets or fear they may do so? In some instances, companies have pledged to refrain from logging in ancient forests in their concessions. This was the path chosen by the largest Scandinavian logging companies, such as Störa and Enso (now Störa-Enso). In cases where the management of these areas is handed back to the government, the ancient forest may receive an official protected area status.

Other companies, especially those heavily relying on ancient forest resources, have sought independent certification. This path has been chosen by tropical timber importer A. van den Berg BV in

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Figure 1.4 Potential impacts of corporate commitments

- Corporate commitment to reduce pressure on ancient forests
- Purchase forest products from non-ancient forests
- Purchases of recycled products or tree-free alternatives
- Reduce paper or timber consumption
- Supplier collaboration
- Yes
  - Contracts with new suppliers with products from FSC forests
- No
  - Supply contracts cancelled or phased out
  - Reduced demand for ancient forest products
  - Ancient forest logging companies: loss of revenue
  - Seek independent forest certification
  - Ancient forest taken out of timber production

---
the Netherlands, which was deeply involved in the development of the FSC-certified forestry operation, MIL (Madeireira Itacoiara Ltd), in the Brazilian Amazon.

After years of pressure from its customers, the Canadian logging company MacMillan Bloedel announced in June 1998 that it would stop clearcutting ancient forests. However, it remains to be seen how this commitment will be implemented and if it is sufficient. Further complicating matters, MB was recently acquired by the US forestry company, Weyerhaeuser.

There is one other option logging companies may resort to: they may seek to open up markets which do not demand green products and they may try to supplement losses made by increasing logging rates. This also happens. It is the point where the influence of wood users reaches its limits, and the responsibility of international government bodies and trade federations is most pressing.

### Box 1.2 Forest certification: The Forest Stewardship Council (FSC)

The Forest Stewardship Council (FSC) is an international, non-profit, non-governmental organisation, which was founded in 1993. Its trademark was launched in 1996 to label timber, paper and other forest products. The label guarantees that the forest of origin has been independently evaluated to comply with an internationally agreed set of high environmental, social and economic standards.

Member organisations of the FSC include representatives of companies throughout the paper and wood chain, environmental groups such as WWF, Greenpeace and Friends of the Earth as well as trades unions and indigenous peoples’ groups. By mid-1999, over 17 million hectares of forest were certified according to FSC standards.

FSC certification involves two main components relevant to wood users:

1. Evaluation and approval of forest management and
2. Evaluation and approval of chain-of-custody systems for each step in the trade link from the forest to end user.

### 1.6 ALTERNATIVES TO ANCIENT FOREST PRODUCTS: THE MAIN APPROACHES

Alternatives to ancient forest products do not just mean other forest products. These are only part of a set of wider approaches which can be grouped under the 5 Rs:

1. Replace ancient forest products
2. Recycle and use recycled products
3. Re-use wood (cascading)
4. Reduce wood and paper consumption
5. Re-think wood use

Replacing ancient forest products is clearly the most direct approach to reducing pressure on ancient forests. The other four approaches are indirect, as they reduce overall demand for (virgin fibre) forest products and thereby pressure on the forest resource, including ancient forests.

#### Approach 1
**Replacing ancient forest products**

Ancient forest products can be replaced by other forest products, such as those from second growth forests or plantations. In most instances it is advisable to seek FSC-certified sources or to start an FSC certification process for uncertified operations (see Box 1.2). Ancient forest products can furthermore be replaced with non-wood products, such as tree-free papers and environmentally friendly building materials, such as straw bales.

#### Approach 2
**Recycle and use recycled products**

Much paper is already being recycled in Europe, Japan and the USA. Purchasing recycled products keeps the system going, as the need for virgin fibre input is thereby gradually reduced. Although wood-based paper cannot be recycled indefinitely, new fibres need not come from trees; tree-free fibres made of straw or hemp may just as well be added (approach 1). Timber recycling is less common, although re-using salvaged lumber (approach 3) is increasing business in the USA. In order to keep the system going, much more could be done to make sure that timber can be re-used and collected for recycling.
Approach 3
Re-using wood
Ancient forest (and other forest) products can often be re-used, if not for the same purpose (like copying on both sides of office paper), then often for another, lower value use. Concrete moulding plywood panels or wooden pallets need not be thrown away after a single use. Re-using resources time after time while maintaining maximum use value until the product must be disposed of is known as ‘cascading’. Figure 1.5 shows an example of the cascade approach applied to wood.

Cascading can also be applied to paper use. In fact, it is more common than timber re-use. Making newspapers from recycled newspapers and magazines assists the overall the paper quality, then the recycled newspaper can be recycled a few times again before it is disposed of.

Approach 4
Reduce wood and paper consumption
Reducing overall wood consumption may involve anything from small steps to reduce office paper use to a complete overhaul of logistics, e.g. by introducing electronic communication. Whereas the need for paper consumption reduction is quite widely accepted, reduced consumption of lumber and wood-based panels is an anything but common approach. Nonetheless, significant opportunities exist.

Approach 5
Re-think wood use
Wood can be the most appropriate material for building houses or storing information. In such cases, much can be gained by an optimal application of the distinctive properties of the species of wood being used. Durable hardwoods are best used outdoors, while softwoods can be used under drier conditions.

One point which is often forgotten is that wood use should start with the question with which every project should really start is the project necessary in the first place? This is the first question raised by the Ministry of Public Works in the Netherlands before it starts a project or responds to regional departments requesting advice on what timber species should be used for bridges, canal linings, etc.
PART 2

timber and wood-based panels
2.1 ANCIENT FOREST TIMBER AND PLYWOOD PRODUCT CONSUMPTION

Wood from ancient forests is used for countless products, including indoor and outdoor furniture, bridges, canal linings, sound walls, crates and pallets, stationery, toys, etc. However, its most important applications are, without doubt, family housing and office construction. Residential construction, repair and remodelling absorb some 45-70% of the total timber and wood-based panel consumption in the USA, Europe and Japan. Important uses of wood products in residential building are house framing, doors and window mouldings, flooring and exterior decoration. Plywood is also widely used for concrete moulding, especially in the construction of offices, hotels and other commercial buildings.

Global consumption of sawnwood and wood-based panels in 1996 was no less than 576 million m³ (Table 2.1). The United States alone consumed one-third of this volume. Per capita consumption of timber and wood-based panels in the USA far exceeds that of the rest of the world.

Much of the sawn (soft) wood timber consumed in the United States is used for wood framing in house construction. Over 90% of the nearly 1.5 million new houses built in the USA every year are wood framed. Framing of walls, roofs and floors absorbs 70% of the wood required for each house. Wood frame building has environmental benefits compared to other materials such as concrete, brick, clay, plastic and steel. One such benefit is that wood framing is a “dry” method, as opposed to building with bricks or concrete. Dry building allows the application of other renewable building products without additives, such as insulation materials of flax, hemp or wool[32]. The obvious problem with wood framing in the United States is that much of the wood used originates from ancient forests, mainly from Canada.

2.2 BUILDING WITHOUT ANCIENT FOREST TIMBER

Given the high per capita consumption of ancient forest timber and wood-based panels, the introduction of new approaches to wood use and the use of new products would have great impact in the USA. Construction companies, architects, project developers and individual households have a range of options to reduce their consumption of ancient forest timber. The most important of these are described below.

<table>
<thead>
<tr>
<th>Markets</th>
<th>Sawn-wood</th>
<th>Wood-based panels</th>
<th>Total</th>
<th>Percentage of world consumption</th>
<th>Per capita consumption (m³ p.p.p.y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>147</td>
<td>45</td>
<td>192</td>
<td>33%</td>
<td>0.71</td>
</tr>
<tr>
<td>European Union</td>
<td>69</td>
<td>34</td>
<td>103</td>
<td>18%</td>
<td>0.28</td>
</tr>
<tr>
<td>Japan</td>
<td>36</td>
<td>14</td>
<td>50</td>
<td>9%</td>
<td>0.39</td>
</tr>
<tr>
<td>Other</td>
<td>175</td>
<td>56</td>
<td>231</td>
<td>40%</td>
<td>0.05</td>
</tr>
<tr>
<td>World</td>
<td>427</td>
<td>149</td>
<td>576</td>
<td>100%</td>
<td>0.10</td>
</tr>
</tbody>
</table>


Extending the lifespan of buildings

By extending the life-time of buildings, timber can be saved for new constructions and maintenance. This involves designing and building durable houses or offices which are well constructed, well protected by a good roof and eaves structure, and with interior space which can be easily modified according to changing needs.

Rethinking wood use in constructions

Rethinking construction methods can significantly reduce the amount of wood required to achieve a given objective. High posted timber frames, for example, can reduce the volume of wood required, as conventional stick framed houses use 1.5 times more wood. Non-wood building materials should sometimes, from an environmental point of view, be favoured over wood. This is not true of steel, aluminium or plastic, but is true such as straw-bale building, adobe clay and rammed earth (15% of the population of France today lives in houses made of these materials). An Alternative Building Sourcebook is available in the USA with a lot of information on this area (see sources). The Guide to Resource Efficient Building Elements, published by The Centre for Resourceful Building Technology, provides a comprehensive overview of suppliers of environmentally innovative building products.

A well thought through application of timbers often allows the use of lower quality timbers, possibly in combination with selective application of high quality timber where it is most needed. A good example of this is the building corporation Woondrecht in the Netherlands. In the 1990s, Woondrecht adopted a policy of reducing its tropical timber consumption. It implemented this through selective use of timber, thereby making the best use of the timber’s durability. On the north side of its houses, it uses less durable softwoods for windows and doors as these are hardly exposed to the dynamics of the Dutch coastal climate. The south/southwest side, however, is exposed to great fluctuations in temperature, sunlight and moisture. Considering the high cost of maintenance and the need for early replacement of softwood constructions compared to hardwood, Woondrecht prefers to use tropical timber for window frames and doors on the south side of the houses. Woondrecht has supplied some of its renovation projects with doors made of FSC-certified kwila from the Solomon Islands.

Re-using timber and using recycled timber

There is an enormous wood resource in the "urban forest" - that is, the used timber frames in buildings constructed in the past. A growing number of companies in the USA sell salvaged timber, turning old wood constructions into new resources. Salvaged timber from the USA is even used in Europe. It can be re-sawn and made into window frames, which are more solid and stable than frames made from fresh wood. The decorative value and ‘antique’ look of recycled timber make it an attractive material for interior flooring and furniture. Smaller pieces of salvaged timber can be recycled as GLULAM (glued laminated timber) or other engineered wood products (see below). Matsuzaki W right Architects Inc. in Vancouver in Canada, received a Professional First Place Award

Box 2.1 Fir & hardwood window frames: Doornenbal

In 1997, the timber manufacturer Doornenbal introduced its Ruvo window frame onto the market. The Ruvo frame combines the best properties of fir wood and robinia. The highly durable hardwood robinia (mostly grown in Eastern Europe and France) is used only for the critical parts of the window frame - the lower parts, where fir would soon start rotting unless treated with preservatives. The rest of the frame is made of fir, which is available in greater quantities (as second growth) and at lower cost. The price of this window frame is comparable to one made of tropical hardwood.

The Ruvo window frame is sold with a 15 or 20 year control and maintenance guarantee (painting and repair works).

33 Timberframe, 1998.
34 Montague, undated.
and other outdoor constructions are often exposed to rain, wind and sun and therefore require durable timber species, many of which come from ancient forests (e.g. merbau/kwila, meranti, hemlock, Oregon pine).

High quality, durable products for outer doors, window frames, etc., made from (sometimes partially engineered) pine or fir timber from secondary forests are now widely available in Europe. It is, however, wise to double check the origin of these products, which has become much easier as

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**Box 2.2 Sunken logs: a temporary alternative?**

One source of timber which does not have to be sustained is sunken logs. After years of river transportation, millions of logs have sunk to the bottom of the rivers and lakes of Canada, Siberia, the Amazon and the USA. Several companies have started to develop these wasted logs as a new, if temporary, resource.

Only 2% of the original forest of New Brunswick, Canada, remains today, but the province’s rivers and lakes harbour an enormous number of logs which were lost when European colonists deforested much of the province and shipped off logs to Europe. The Canadian company Ecotimber is now harvesting the lost logs. Regional demand is so great that Ecotimber cannot even think of exports.

**Box 2.3 Cardboard Pallets**

Wooden packaging made from ancient forests, such as pallets, is often used to transport consumer goods around the globe from countries in Asia to Europe and from countries in North America to Asia.

A small number of manufacturing and food production groups have now switched to pallets made from cardboard for some loads. Among those that have made the change are the UK divisions of Proctor & Gamble, Kellogg’s, Nestle, Glaxo Wellcome, Ricoh and RS Components.

The main environmental advantage of cardboard pallets is that they can be recycled, while wooden pallets may require costly disposal or have to be returned to their owners over great distance. Cardboard pallets cost about the same as wooden pallets but weigh two-thirds less than the wooden variety, making them cheaper to transport. They are about the same size as wooden ones and are reinforced to support loads up to two tonnes.

Three UK-based packaging companies are, between them, likely to produce about 500,000 cardboard pallets during 1999, from only a few in 1995. Bob Ferguson, business development manager for David S. Smith, the biggest UK maker of cardboard pallets, said the market was growing “exponentially”. The other two makers are Weedon Holdings, a privately owned packaging company, and Smurfit, an Irish packaging concern. Weedon uses technology for its cardboard pallets which was devised in the USA in a joint venture between Smurfit and Stone Container, a big US packaging business.

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37 IKEA 1998
38 Financial Times 1999.
several major forestry companies in Sweden (Störa-Enso, Assi Doman, SCA) have certified their Swedish forestry operations, according to FSC-standards. In Sweden, these companies do not log ancient forests nor do they purchase logs derived from such forests as part of the agreement on the Swedish FSC standard.

**GLULAM for solid timber**

GLULAM (glued laminated timber) was one of the first engineered wood products to enter the marketplace. The glulam production process is quite simple. Planks of a thickness of 50mm or sometimes more and lengths of 1.5-5m are kiln dried, pre-planed and strength graded, joined lengthways by glued finger joints and, after planing, laminated to the desired thickness. Finally the “endless” glulam beam is cut to the desired length and planed.

GLULAM is now widely used in the USA and exports to Japan and other countries are increasing rapidly. Glulam competes with ancient forest timber on two scores:

- Of a given number of trees, a higher percentage can be used for glulam than for solid sawn timber. There is less waste.

**Box 2.4 Engineered wood products**

Prime grade timber from ancient forests is no longer required to manufacture quality products for housing applications such as windows, doors and plywood parts. Engineered wood products increase the opportunities for using small diameter logs from secondary growth forests and plantations, and even recycled timber and plywood. Weyerhaeuser’s Director of Materials Technology, Dr Neogi, concludes that the disappearance of old-growth timber is “the major driver behind the rapid growth of engineered wood products.”

Some engineered products require less solid wood to produce the same quality final product. The Rugby Group’s joinery division in the UK estimates that it uses up to 60% less solid wood each year by using laminated MDF in its panelled door range, reducing the need for ancient forest (clear) timbers. This has directly reduced its purchases of ancient forest timbers from countries like British Columbia and Asia.

The biggest company producing engineered wood products in the USA is Trust Joist MacMillan (TJM) with ten plants in the USA and three in Canada. TJM is a joint venture of Trust Joist Corporation and MacMillan Bloedel Limited (MBL). On engineered wood products, Vic Worthy, Senior Vice President of MBL’s Composite Wood Group said in 1996: “These are the growth products of the future and we are locating plants close to the markets, to lower freight costs. In addition, MBL must look outside BC for opportunities for growth, as the timber supply in the province is declining.”

Engineered wood products which depend on ancient forest wood for their production, also faces growing public resistance. Oriented Strand Board (OSB) producers Boise Cascade in Chile is facing international protest, exactly for that reason. This leaves companies that aim to sell their engineered forest products as appropriate alternatives to ancient forest products should certify their sources and the chain of custody. Engineered wood products increases wood use efficiency as well as spares an enormous amount of roundwood.

Without the introduction of engineered wood products, the USA would have required 76 million m$^3$ of roundwood in 1993. Engineered wood products required an input of 53 million m$^3$, thereby sparing 23 million m$^3$ (30%) in addition to the amount of former waste they incorporate, now about 9 million m$^3$.

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40 FAO 1999.
41 Neogi 1998.
42 Barclay 1996.
43 Wernick et al. 1998.
The strength properties of GLULAM beams are similar to or better than those of ancient forest timber because the defects in natural timber are eliminated. This allows more precise engineering of construction design, which can save wood.

**Reconstituted wood products for solid timber**

Laminated Veneer Timber (LVL), I-joists and Parallam are engineered wood products, but they are more intensively processed than GLULAM or plywood. This is why they are referred to as reconstituted wood products.

**LVL** is expected to replace increasingly scarce solid sawn timber in structural applications in future. LVL is a product close to plywood, except that (most of) the veneers are glued parallel and that larger dimensions are available. It has better strength properties than GLULAM and solid sawn beams. LVL is applied as beams and posts, I-joists (see below) and trusses. In the USA, seven companies produce LVL; other companies are located in Japan, Finland, Australia and New Zealand. In the USA, LVL is now used only in buildings where higher strength is needed or larger spans are desired. In 1993 the production of LVL was estimated at 440,000 m³ in the USA, 51,000 m³ in Europe and 40,000 m³ in the rest of the world. Production shows a rising trend. In 1996 LVL use in the USA mounted to almost 700,000 m³, with over 75% applied in I-joists.

In Europe and Japan, I-joists are almost unknown. In the USA, however, they may be the most commonly known engineered wood product. I-joists consist of OSB or plywood stuck between two strips of solid sawn, finger-jointed or engineered wood. Together they form an “I”.

According to the American Engineered Wood Association, I-joists are now used in 20% of all new homes built in the USA, replacing solid sawn timber. I-joists are 50% lighter in weight than solid sawn wood.

Parallam Strand Timber (PSL), developed in the 1970s in Canada and now produced in the USA, is made of long strands of wood glued together, which end up looking like “compressed spaghetti”. Intrallam is made from large parallel chips of up to 30cm in length which are glued with a polyurethane adhesive. Another veneer product is called Intrallam beam, made of wooden chips of young poplars, typically 30 years old when cut, which are glued with polyurethane and processed into a board out of which beams can be sawn. The producer claims that young trees from production forests can be used, instead of ancient forest logs, and that the process is 30% more efficient on log consumption than traditional sawing.

**OSB for structural purposes**

Plywood and solid timber are increasingly being replaced by Oriented Strand Board (OSB). OSB consists of about 97% of oriented wood strands of up to 7cm in length and glued together in three layers.

The annual use of OSB or waferboard for structural purposes for new single-family houses in the USA expanded from zero in 1969 to 242 million m in 1992. While OSB can be used for structural purposes, it cannot replace every single specific use of plywood in construction. Almost all OSB is produced and consumed in the USA and Canada. Canada produced 4.7 million m³ of OSB in 1996; the United States produced 8.2 million m³.

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52 IVAM Environmental Research, 1998. MDI is also used (often introduced as “formaldehyde-free board”), but this adhesive has a relative high environmental burden and application and production leads to health hazards. The energy requirements of OSB are lower in comparison with plywood and the amount of adhesive used are about the same.
54 FAO 1997.
OSB production in the USA was boosted by the closure of one-third of the plywood plants in North America because logging of the ancient forests in the western US National Forests was coming to a halt. OSB can also replace many applications of tropical plywood, such as meranti/lauan plywood from Asia, plywood from the Amazon and okoumé plywood from Central Africa.

2.3 PANEL PRODUCTS

Throughout the world, veneer and plywood mills have often been built to process large diameter logs, which are usually derived from ancient forests, particularly in the tropics. Plywood is mostly used for short term, non-structural and interior purposes. As such it can be, and already is, replaced with Medium Density Fibre (MDF) board. MDF is already out-competing plywood in the furniture industry and this is expected to continue as MDF will soon be available in high-quality overlays or prints that look just like hardwood plywood.

MDF is an engineered wood product, made from wood dust and glue. The wood for producing MDF may be derived from well managed forests, plantations, milling waste or rainforest hardwoods. Given these unclear sources, only certification provides an adequate guarantee of responsible
forest management. MDF can also be made from non-wood and post-consumer waste wood. Like MDF, OSB has also started to replace plywood as higher quality logs from ancient forests are becoming scarce. There are, however, various other alternatives.

**Box 2.7 Straw-panel furniture: Sauder Woodworking**

Sauder Woodworking Inc. is the biggest maker of Ready To Assemble (RTA) furniture in the USA, with 1997 sales totalling US$ 500 million. On the decision to buy tree-free board, Kenneth Sauder states: “One, early indications show it seems to have the uniformity characteristics of MDF yet with particle board price. Second, it ensures another source of supply that is not tied to the spotted owl. The long-term supply seemed to be strong, and we felt it was best to encourage that. Third, it has some moisture resistance attributes for any kitchen applications or vanities, or for international sales in hot and humid climates."

VT Industries, based in Iowa, USA, produces doors, countertops and components for kitchens and office furniture. John Fell, corporate purchasing manager for VT Industries says: “It’s the attractiveness of the renewable resource of (straw) board. That’s going to relieve some pressure on our forests. People are more and more concerned over the impact on the environment, and we feel this is much better, not having to rely on wood by-products.”

Wheat straw and soybean stalks

The use of fibre other than wood for the production of particleboard is rapidly increasing. Plants using wheat straw for panel board production have been built in the USA and Canada within the past decade. Particleboard plants using cotton stalks have been built in India. MDF plants are operating in Malaysia using palm-oil and rubber trees as a raw material.

Tests in Germany and Sweden have demonstrated that non-structural particleboards of straw and soybean stalks have equal or better physical properties than those using wood. Strawboard is more homogenous than particleboard, and could be used in higher value furniture and cabinet production, replacing MDF and particle board. At least seven companies in Canada and the United States are currently producing - or have plans to produce - wheat straw/soybean/hemp particle and/or MDF board:

- PrimeBoard of Wahpeton, North Dakota
- Natural Fibre Board of Minneapolis, Minnesota
- CanWel of Hutchinson, Kansas
- Alta Goldboard of Thorhild, Alberta

**Box 2.6 Bamboo veneer: Emvier**

The quest for alternatives to tropical timber has already led to the development of many innovative products. Bamboo, widely used for house construction and furniture in the tropics, is one of those products. Several companies in Europe now supply bamboo parquet, replacing species such as merbau. Research by the University of Eindhoven has shown that bamboo could even be used for housing constructions in Europe or the USA. The company Emvier in the Netherlands produces bamboo veneer, which is used for decoration of interior doors, furniture panels and parquet, thereby replacing ancient forest veneers like mahogany. Bamboo production in Asia, like rattan which is widely used for furniture, does not degrade ancient forests. FSC certification of bamboo and other non-timber forest products will soon be possible, and is recommended in order to guarantee responsible resource management and workers’ rights. Some bamboo species are grown in temperate climates.

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FAO 1999.
FAO 1997, forest products annual market review.
Wood and Wood Products 1998.
AgraFibre of Wanham, Alberta
Phenix Biocomposites of Mankato, Minnesota
Isobord from Isobord Enterprises Inc. in Minnesota, Canada
Industrial AG Innovations
Kafus Environmental Industries, Vancouver
Agriboard Industries, Texas

As Dough Hathaway, Vice President of sales and marketing for Alta Goldboard puts it, “You have to find your fibre from somewhere else. We’re going to go to the grain forest and leave the rainforest alone.”

Some manufacturers of easy wall systems made of straw panels in Europe are:
- Stramit, the United Kingdom
- BioPack Karphos, Germany
- Pantene, Belgium

Agriboard Industries in Texas produces a structural insulated panel board from wheat or rice straw. The cover (linerboard) is made from wood-based Kraft paper, but the company is exploring the possibility of making that paper out of straw as well. Agriboard’s product can reduce the use of framing timber in a structure by up to 90%.

In 1994, a small Canadian company set out to become a major global panelboard producer without relying on primary fibres or urea formaldehyde resins. CanFibre’s goal of recycling 100% waste wood fibre to produce superior Medium Density Fibreboard (MDF) is now a fact.

CanFibre’s ALLGreen® MDF represents a major breakthrough in the panelboard industry as it is made entirely from 100% recycled waste wood fibre materials normally landfilled. As much as 12% of landfill space in the USA is consumed by waste wood. CanFibre developed the technology to turn high volumes of wood waste into a resource stream and estimate that it is extraordinary inexpensive, costing around US$ 5 per tonne compared to US$ 100 per tonne for virgin wood. In Europe, new stringent recycling legislation will only encourage further the use of such wood waste.

According to CanFibre, the MDF is lighter, emits no formaldehyde and is available with fire resistant (FR) and moisture resistant (MR) grades. Its applications run from panelling and furniture for schools, libraries and commercial buildings, to fire-rated doors, elevator cabs, motor home interiors, garage door panels, bathroom and kitchen cabinets, and boat interiors.

The CanFibre Group is currently engaged in the worldwide development of production facilities at Riverside, California; Lackawanna, New York and Amsterdam, Holland.

North America
The first plant, a US$ 120 million facility, was built in Riverside, California and began production in early 1999 with a capacity to convert over 155,000 tonnes of old pallets and demolition waste into 24 million square metres of ALLGreen® MDF annually. The Riverside plant is near Los Angeles, where about one million tonnes of wood is landfilled every year within 100 miles of the plant. A second is being built in Lackawanna, New York State, and is expected to come on stream in 2000. A third plant is proposed for a 25 acre site in South Chicago. CanFibre has already signed wastewood supply agreements and sales contracts for the purchase of the entire annual output of all three facilities.

Europe
CanFibre is currently developing plans for three plants in Europe, together with three more plants in key Commonwealth markets. CanFibre is completing all the elements required to finance, construct and operate a $150 million MDF facility to be located in the Port of Amsterdam. This facility will be 60% larger than existing CanFibre facilities coming on line or under construction in the United States.

Further finance has been agreed for a facility to be located on Canvey Island, east of London. The facility is expected to have a total cost of approximately US$ 120 million. Wood supply agreements at guaranteed prices for the coming 20 years have been signed for all the waste wood required.

Sales Contracts Already Signed
To ensure a market for its products, CanFibre is signing up buyers before its plants go into final production. It has already signed a 20-year deal with an Oregon company, Timber Products Company, which has guaranteed purchase of 100 per cent of production from the Riverside and New York MDF plants. Its European affiliates will take 100% of the output of the Dutch CanFibre facility under a 20 year agreement.

Box 2.8  Board out of waste wood: CanFibre Group

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62 Agriboard in pers. comm. with Bill Barclay, Greenpeace International.
Alternative wood-based panels for exterior applications

Substantial amounts of plywood, mainly from Sarawak, are used for concrete moulding (‘con pane’) in Japan. Russian wood has started to replace tropical plywood in recent years - which does not relieve the overall pressure on ancient forests. However, con pane is also being more frequently recycled, which is a positive development. Given the large volumes of waste wood in the vicinity of large Japanese cities, there may also be the opportunity to develop waste wood-based panel processing plants.

2.4 WOOD PROCESSING TECHNOLOGIES

Star-sawing

A new way to saw up logs has been developed by the Swedish Royal College of Technology and KTH-Trä. Compared to conventional sawing of softwood logs, ‘star-sawing’ reduces wastage by a third and produces stronger timber, which contains no piths and little juvenile wood. The method gives sawn timber with two different shapes: conventional timber with a rectangular cross-section and timber with a triangular cross-section. The triangular portions derived from star-sawing can be glued and finger-jointed into boards, which are especially suitable for the manufacturing of windows, floors, furniture and musical instruments because they tend to distort and crack less than traditionally sawn wood.

A star-sawmill started production in Sweden in early 1999, operated by Nova Wood which is partly owned by SCA. It will process an estimated 14,000 m³ of pine a year. SCA’s head of marketing, Anders Ek, says that these boards sell for between 50 and 75 percent more than ordinary timber of the same dimensions. He expects to generate two or three times the usual value from each log. Manufacturers can get access to the technology by obtaining a licence from PrimWood AB, the patent holder. The technology is suitable only for logs smaller than 27 cm in diameter. The Swedish Royal College of Technology is working to adjust the technology for larger logs and hardwoods.

A film industry in California has been a major consumer of tropical hardwood plywood, which it used to construct film sets and then threw away. Before Rainforest Action Network began campaigning against the use of ‘lauan’ (which basically included meranti, virola, malapi and other ancient forest plywood), Hollywood used a quarter of a million plywood sheets a year.

In 1994, Paramount agreed to stop using tropical plywood. Disney Warner Bros. greatly reduced consumption, and its first lauan-free film was Batman III. Fox Studios and MCA/Universal Pictures joined ranks and decided to refrain from using tropical lauan plywood to build movie sets. MCA/Universal will use Unicore board, which is made from 100% post-consumer recycled waste instead.

In response to the campaign and Hollywood’s commitments, Simplex Products designed ‘Studio Board’, a replacement of lauan plywood. Studio Board is made of 85% recycled material, and has no toxic adhesives.

Box 2.9 Tropical Plywood - Hollywood feature ancient forest free films

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From Softwood to Hardwoods

There are various revolutionary initiatives which give softwood the same properties as hardwoods.

PLATO

PLATO (Providing Lasting Advanced Timber Option) is one promising new wood processing method from an environmental point of view, as no substance is added to the wood and the struc-

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64 Various references by Rainforest Action Network and Rainforest Information Centre; Simplex Products Division, An Antony Industries Company. Studio Board, Sales Binder.
65 Tickell 1998.
ture of wood stays intact. It is a pure physical thermal treatment through an autoclave wet-heating system.

Though thermal treatment of wood is not completely new - the first publications about trials date back to the 1930s - the PLATO process, developed in 1993 in the Netherlands, seems to be a more sophisticated and operational treatment to make wood more durable. The process makes softwoods - such as Scots pine, Douglas fir and Norway spruce - into a product which has the durability of iroko or teak. Strength properties do not change substantially in comparison with the untreated wood. The dimensional stability of the wood is enhanced, and the technology also makes it possible to compress and bend wood in the shape which is desired.

Funded by banks and shareholders to the tune of US$ 15 million, the first commercial factory will open in Arnhem, Holland in the year 2000 and will initially produce 50,000 m³ of PLATO timber. The final production capacity is set to rise to 150,000 m³ within five years. Other PLATO processing plants are planned worldwide.

The raw material input for the PLATO process is, in this case, untreated sawnwood of a quality comparable to that needed for GLULAM production. The maximum thickness of planks to be hydrothermally treated is about 5cm, so for the option of a PLATO processed purlin (a structural joist) it is also necessary to laminate planks to obtain the desired size. Less energy is required to process a purlin this way than laminated veneer timber. Eucalyptus, and some soft broadleaf tree species, are also potential raw materials for the PLATO process.

**Acetylation**

Acetylation is a process similar to PLATO as it makes coniferous wood more durable and stable. The timber is treated with acetic anhydride, which alters the molecular structure of the cell walls of the wood making it heavier. The company which developed this acetylated wood, Acelyteer Kennis BV, claims that acetylated wood has a high dimensional stability and is very resistant to decay (durability class 1). Like PLATO wood, acetylated wood can become an alternative to tropical and temperate timbers (e.g. mahogany or western red cedar) normally used for window frames, doors and staircases. A pilot plant is due to be built in the Netherlands in the coming years.

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67 The PLATO process consists of three steps: thermolysis, drying and curing. During thermolysis hemicellulose is decomposed and lignin transformed into smaller reactive structures, while the cellulose structure remains essentially unchanged. During the second stage of the process, dry heating results in a reaction of the earlier mentioned reactive intermediates forming a thermosetting resin, penetrating the cellulose fibrous material and producing a rigid structure which retains the appearance of natural wood.

68 TTJ 1999

69 A purlin is a horizontal beam that provides intermediate support for the common rafters of roof construction.

70 PLATO 1997; Fraanje 1998.

2.5 FSC-CERTIFIED TIMBER

Sawn wood from FSC-certified forests is already available in Europe, and to a lesser extent, in the USA and Japan. As of mid 1999, more than 175 Forest Stewardship Council endorsed certificates for forest management covering over 16 million hectares worldwide has been awarded. The area under FSC endorsed certificates covers all major forest types and regions, and is expected to continue to grow very rapidly over the coming years.

Support for the FSC label is running high among many major purchasers and retailers of forest products. In the UK, a group of 85 companies with annual turnover of wood and wood products totalling more than US$ 4.3 billion dollars has agreed to preferentially purchase FSC certified products as they come available and eliminate purchases coming from forests which are not well managed. In November of 1997, the Certified Forest Products Council was launched in the USA. It currently has more than 140 corporate members, including the Turner Corporation, the nation’s leading general builder, Home Depot, the world’s largest “Do-It-Yourself” home supply chain, and Habitat for Humanity, one of the USA’s largest homebuilders. Other groups of buyers supporting the FSC system have been established in the Netherlands, Belgium, Austria, Switzerland, Germany and Spain.

Over 3,000 different FSC labelled products are being sold in the UK and many more are in development. Supplies are expected to increase considerably in the next few years. The FSC-UK prepares an updated “Directory of Manufacturers of FSC Certified Products Worldwide” every six months, which offers the most comprehensive single source of information for large consumers of forest products72.
PART 3
3.1 ANCIENT FOREST PULP AND PAPER CONSUMPTION

The bulk of ancient forest pulp and paper in the world is produced in Canada. Wood Resources International estimated that in 1993, at least 70% of the raw material processed by the Canadian paper industry came from ancient forests. Much of this ends up as graphic paper and newsprint, consumed in the United States. Canada’s pulp, paper and newsprint exports to the USA added up to well over US$ 10 billion in 1997. Russian paper plants rely on ancient forests for 76% of their pulp. Most of the wood pulp processed by Japanese paper factories is imported from ancient forests in Chile, Canada and Australia.

Considering total and per capita paper consumption for the world’s major paper markets, paper from ancient forest pulp is probably largely consumed in the USA. The paper consumed in Europe and Japan has a lower overall ‘ancient forest content’. Nevertheless, some papers are largely made from virgin fibre, notably printing and writing paper. The fibre required comes from second growth forests and plantations, but also ancient forests in Canada, Russia and the Far East.

By volume, most paper in the world is used for paperboard and packaging (see Figure 3.2), which generally has a high recycled content. Most relevant to ancient forests are printing and writing paper (including office paper) and newsprint, which have much higher virgin fibre contents, although regional differences do exist (see section 3.4).

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73 Wood Resources International 1996.
74 This value also represents a percentage of recycled paper product exports. Industry Canada, based on data from Statistics Canada  viewed October 25 1997.
75 IIED 1996.
3.2 PULP AND CARBON EMISSIONS

The pulp and paper industry is a significant emitter of greenhouse gases. According to the International Institute for Environment and Development’s report Towards A Sustainable Paper Cycle, produced for World Business for Sustainable Development, for the industry to become a net zero emitter, it would need to pursue changes at all levels of the paper cycle:

- Curtailment of timber extraction from ancient forests in Russia, North America and some developing regions. Around 17% of all wood pulp production is derived from ancient forests, which are a globally significant reservoir of carbon.
- Efficiency improvements in manufacturing, such as reducing the use of fossil fuels.
- Alternative disposal routes to landfilling, such as recycling and resource reduction.

3.3 OFFICE PAPERS

Reduction of office paper use

Office papers include letterhead paper, copy paper, paper in printers, envelopes, forms, etc. A4-size paper is the most used office paper, accounting for approximately 10% of global paper use. In Western Europe, there are currently around 20 million offices using 75-85kg per year of office paper per employee.

Paper use reduction programs reduce pressure on ancient forests and landfill sites, and reduce the costs for paper purchases, copying and printing, postage and waste disposal. Many government and corporate offices have adopted policies to reduce office paper use and, in many instances, substantial cuts in paper consumption have already been achieved. Effective paper reduction programmes usually involve:

- Introduce double-sided copying and printing
- Using lighter-weight papers, smaller margins and efficient letter types
- Using copiers and printers which can handle recycled paper properly and that support double-sided imaging
- Reducing unnecessary paper information
- Cleaning-up address files (saves greatly on postage)
- Reducing accessibility to copiers and printers
- Shifting towards electronic media communication and archiving

Table 3.1 Main paper consuming markets, 1997 (million metric tonnes)

<table>
<thead>
<tr>
<th>Markets</th>
<th>Paper and Paperboard consumption</th>
<th>Share of world consumption</th>
<th>Per capita consumption (kg/p.p.p.y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>97</td>
<td>33%</td>
<td>323</td>
</tr>
<tr>
<td>Europe</td>
<td>69</td>
<td>23%</td>
<td>184</td>
</tr>
<tr>
<td>Japan</td>
<td>31</td>
<td>10%</td>
<td>249</td>
</tr>
<tr>
<td>Other</td>
<td>100</td>
<td>34%</td>
<td>20</td>
</tr>
<tr>
<td>World</td>
<td>297</td>
<td>100%</td>
<td>51</td>
</tr>
</tbody>
</table>


According to the International Institute for Environment and Development (IIED), most offices can achieve a 20% cut in consumption of paper through good housekeeping, while the greatest cut - up to 50% - requires a change in systems, such as computer-based communications and information management.

75 IIED 1996.
77 Robins and Roberts 1996.
Today, 90% of the information used at the average office desk is on hardcopy paper. Methods of sending, receiving, and storing information without paper (e-mail, Intranets, Internet, CD-Roms, electronic ordering and paying, etc.) are already being adopted on a wide scale in the USA, Europe and Japan. It is expected that by the year 2004, as much as 70% of the information used at the office desk will be electronic.

This development will be driven largely by the direct benefits of electronic media. They include increased productivity, space savings and reduction of storage costs. A Compact Disk, for example, can store as much information as half a tonne of printer paper.

**Introducing recycled office paper**

The introduction of recycled paper in the workplace has in the past been hampered by technical complications, poor quality, high prices and limited availability. In recent years, many of these problems have been overcome. Copiers and printers can be adjusted to handle recycled paper properly, different brands of recycled paper compete in

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### Box 3.2 Osaka Gas: Successful paper consumption reduction in Japan

In June 1995, the Government of Japan launched the “Action Plan on Greening Government Operations”, with a target to stabilise paper use in the year 2000. While this plan is apparently being implemented with little force, the Japanese company Osaka Gas, one of the biggest gas utility companies in the world, started a successful paper reduction programme in 1993 (see Figure 3.3). In 1996, total paper use by weight, including copy paper, printing paper, name cards and stationery, was reduced by 35.3% compared to 1992. Since July of 1996, Osaka Gas has made a complete switch to recycled paper for copier use (80% recycled content) and, as a result, the proportion of recycled paper used for copying increased to 98%. Overall combined use of recycled paper for copying, computer output paper, name cards and stationery has reached 82%. The reduction in paper consumption, recycling of waste paper and use of recycled paper is equivalent to about 32,000 tonnes of pulpwood.

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### Box 3.3 Less paper through the Internet: AT&T’s electronic bills

US communications giant AT&T is working to move customers to electronic phone and internet bills and threshold billing. This shift reduces paper use and at the same time provides consumers with up-to-date account information. AT&T estimates that some 21 million sheets of paper are saved each year through the following measures:

- Offering consumers a totally paperless billing process. This electronic billing has saved about 600,000 sheets of paper a year.
- Combining long distance phone bills with internet bills in a totally web-based process. This saves approximately 200,000 sheets a month.
- Implementing “threshold billing”, where consumers are not sent a bill unless their monthly total exceeds a certain amount. Consumers who are billed directly by AT&T (as opposed to through their local provider) do not receive a bill until the billing total reaches the threshold amount, or every three months, whichever limit is reached first. This saves the sending of about 1.5 million bills each month.

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78 The State government has no policy yet to use post-consumer recycled paper, though some departments might use this paper. Pers. comm. Yoichi Kuroda, JATAN 23 October 1998.
79 Data derived from: <http://www.osakagas.co.jp> viewed on 4 November 1998.
80 Xplor 1998.
81 Neogi 1998.
82 Pers. comm. B. Allenby, Vice President Environment, Health & Safety, AT&T, received 11 November 1998.
whiteness with bleached virgin papers and many wholesale dealers offer a range of recycled paper, allowing a consistent corporate image. Greater availability and competition between suppliers has dampened prices. As a result of government regulations aiming to reduce landfill and to increase the availability of post-consumer paper waste, the utilisation rate of recovered paper in overall paper production is rising (Table 3.2). Indeed, within the next ten years the world will already be manufacturing more paper from recovered fibres than from virgin fibres. Still, much higher recycling rates need to be achieved.

The need to introduce recycled paper is increasingly recognised by governments and the private sector. They have adopted policies to promote the use of paper with recycled content, not only to address their own paper use, but also to set an example to others. Recycling paper helps to close the loop, preventing waste going to landfill. Especially valuable elements of these policies are ambitious targets, continuous monitoring of progress and transparency.

As early as 1992, the German parliament insisted that at least 90% of paper use by government departments should be 100% post-consumer recycled and that progress should be regularly reported. This policy has been exceptionally successful. By the end of 1993 all by one department had complied with the 90% goal. Only the Department of Traffic and Agriculture got stuck at 40%\(^84\). Various sources confirm that in 1998 almost all the paper used by the German government was recycled paper. The German government has also promoted recycled paper use in the marketplace by issuing the ecolabel ‘Blaue Engel’ (Blue Angel) to paper with 100% post-consumer recycled content. Copiers are awarded the ‘Blaue Engel’ label if recycled paper runs well on them.

### Box 3.4 US Federal government: building markets for recycled goods

As the nation’s largest paper buyer, the US Government buys more than 2% of all printing and writing paper sold in the USA\(^85\). In September 1998, President Bill Clinton signed an executive order (EO) requiring that federal government offices start using paper with recycled content. The target was that, from 31 December 1998, all federal agencies should purchase paper with at least 30% post-consumer recycled paper content. Purchases of paper with at least 20% post-consumer recycled content are obligatory\(^86\). The EO applies to all office paper, notably copier paper, offset paper, writing papers and envelopes. President Bill Clinton clarified the wider goal of the executive order as follows:

‘... the federal government has a special responsibility to lead the way in building markets for recycled goods. (...) We will harness our tremendous purchasing power to spur the growing market for recycled products’\(^87\).

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84 Abfallwirtschaft 1993.
In the USA and Japan private and public organisations have joined in recycled paper buyers’ groups. These groups maximise efficient use of paper; they demand recycled post-consumer paper products, and initiate dialogue with the paper industry. In the United States, the following 100% post-consumer recycled office paper brands are now available, among others: Astrolite PC100 (supplied by Monadnock Paper), Eureka! 100 (Ft. James), Genesis (Fraser Paper), Options (Mohawk), Quest (Fox River) and Sandpiper (Domtar). The guide “10 Easy Ways to Buy Recycled: A Smart Shopper’s Guide to Closing the Loop” provides practical advice to companies wishing to purchase recycled paper products in the USA. Box 3.5 describes one of Europe’s most advanced office paper mills, UK Paper.

### Box 3.5 Recycled office papers: UK Paper

In 1997, UK Paper finished building a Recycled Fibre (RCF) plant which produced true white recycled pulp from mixed post-consumer waste. The company invested £43 million (US$ 66 million) in the plant, incorporating the best recycling technologies used by modern plants in the USA and Japan. No less than 99.5% of the inks from the recovered paper are removed, allowing UK Paper to produce high quality paper in terms of cleanliness and brightness. The recycled office papers the UK Paper company produces are virtually indistinguishable from virgin fibre papers. Judith Davis, Marketing Manager, of UK Paper says: “the quality of our recycled pulp is superior and more competitive to anything processed and produced by anyone else in the world”.

The RCF mill currently uses 180,000 tonnes of mixed post-consumer waste per annum to produce 120,000 tonnes of recycled fibre. Of the 60,000 remaining tonnes 55,000 tonnes is turned into agricultural fertiliser. This is mainly the clay and fillers in the collected paper, but also some small fibres. The RCF plant uses a totally chlorine-free bleaching process. A waste-water treatment plant and a combined heat and power plant increased investments to £100 million (US$ 156 million).

The majority of the recycled pulp is used to produce a range of office papers. The brands Evolve Business and Evolve Office are both 100% recycled office papers, and acquired the Nordic Swan and the Blue Angel ecolabels. The coated grades of Evolve papers, Silk and Gloss, used primarily for reports, accounts and corporate literature, contain 75% recycled fibres.

The whole of the EVO LV range (Business, Office, Gloss and Silk) have been assessed for the Archival Guarantee and have been awarded international standard ISO 9706:1994 and DIN 6738 (requirements for paper performance). This standard guarantees that the paper will not deteriorate with age, unlike a number of other recycled office papers which may contain fibres that will turn yellow over a period of time. The Evolve papers are proving a popular choice with one central and some local government bodies, including the DETR (Department for the Environment, Transport and the Regions), Birmingham City Council and Coventry City Council. Other users include:

**UK:**
- North West Water, the Children’s Society, DHL International (UK) Ltd., Cable & Wireless Ltd., Sainsbury’s, Fiat, Glaxo Wellcome, Rio Tinto, British Nuclear Fuels Ltd. (BN FL) and Shell

**Holland:**
- NS Rail Infrabeheer (branch of the national railway), ABN-AMRO (this bank uses coated versions for its environmental report only)

**Europe:** Ericsson

The RCF plant is located on the edge of one of the world’s largest waste paper “urban forests”, London. Moreover, UK Paper’s facilities are in the midst of one of the largest markets for graphic and business papers. Current estimates show that UK Paper is receiving only about 15 per cent of the paper recovered from London’s offices. In order to access urban resources, the company has set up long-term contracts with 25 waste paper suppliers throughout the UK, to guarantee continuity and quality of supply. This has also allowed recovered paper suppliers to develop their own waste collection operations as they have guaranteed business. To date, no other European paper manufacturer has employed the technology used by UK Paper. However, Judith Davis expects “others will soon follow.”

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90 See Makower 1997.
Re-usable paper
The Media Labs of the Massachusetts Institute of Technology (MIT) in Cambridge (USA) are developing a desktop printer and re-usable paper substrate capable of producing a high-quality, high-contrast image, which may subsequently be erased and rewritten multiple times without any expendable materials, such as toner or chemicals. The material, called electronic ink, may change its image reversibly many times by application of an electric field. Research leader Joseph M. Jacobsen believes that: “Large offices will use reversible paper by 2010 if the price for such material can be made commensurate with today’s costs for normal paper and if the quality of the image is high.”

Another project is being carried out by Toshiba Corporation of Japan, which has developed a prototype of ‘decolorable’ printing ink that could make recycling faster and cheaper and achieve higher yields than conventional processes. The ink, which can be made invisible by heat treatment or solvents, helps to overcome existing difficulties in removing ink on used paper.

3.4 PRINTING PAPERS
Printing papers other than office paper (magazines, direct mail catalogues, junk mail, inserts and large corporate mailings) account for approximately 11% of global paper use. Printing paper has a notoriously low recycled content. In Western Europe, only 6.6% of all printing paper other than newsprint contained recycled paper in 1997 (see Figure 3.4). The world average growth in per capita paper consumption between 1994 and 2010 is expected to be 2.8%, but high quality printing grades will have a much faster growth than that, rising to approximately 3.8 - 4.3% per year.

New technologies in paper manufacture offer opportunities to decrease the environmental impacts of paper by using lighter or cheaper grades of coated mechanical papers without sacrificing print quality.

Traditionally, coated mechanical papers are composed of one-third mechanical pulp and one-third chemical pulp, the remainder being fillers and clay coating. Cost reduction strategies adopted by a number of major magazine paper manufacturers enable them to use recycled or cheaper fibres at lower costs for products with the same printing properties (see Box 3.6).

93 The main ingredient in traditional ink, carbon black, cannot be broken down or chemically decolored. Financial Times, 10 January 1998; Nature 1998.
94 IIED 1996.
95 CEPI 1997.
96 Gundersby 1996.
Box 3.6 Recycled printing paper: Haindl Papier

The German paper manufacturer Haindl Papier prides itself on being one of the paper industry’s important pioneers. It started to recycle recovered paper back in 1962 and today consumes some 1.5 million tonnes of fibre every year, which accounts for around three-quarters of its paper production. The Haindl Group has the highest processing capacity for recovered paper of any printing paper producer in Europe, producing newprint and magazine grade papers. (see Figure 3.5)

The main reason for the expansion of recovered paper processing was the introduction of a new grade of mechanical coated paper at Haindl’s Augsburg mill. The A new ‘film-coated’ paper coating process, Film-Coated (FC), allows the use of up to 50% de-inked recycled pulp in the base paper, producing high quality magazine paper. Haindl’s FC papers are marketed under the SCALA brand.

The FC process allows the simultaneous on-line film coating of the surface of the paper and can be applied to most types of paper machines. The result is that the papermaking machine can run at higher speeds, thus reducing costs. The process creates a bulky paper with good opacity that provides a better print yield and is lighter than traditional light-weight coated mechanical papers.

With the success of these new papers in the marketplace, Haindl has announced it is increasing its output of FC papers at its Augsburg mill. The investment of around US$86 million will create the world’s largest coated paper machine, with an annual output of approximately 400,000 tonnes. It is scheduled to start production in June 2000.

3.5 NEWSPRINT

Recycled newsprint

Newsprint, the paper grade which newspaper is made of, accounts for approximately 13% of global paper use\textsuperscript{99}. About 54% of newsprint consumption in the USA is imported from Canada\textsuperscript{100}.

The introduction of innovative recycling technologies has enabled manufacturers to produce recycled newsprint (from old newspapers/magazines) that can match or surpass the performance of genuine primary fibre newsprint\textsuperscript{101}. A recent study by the German Institut für Papierfabrikation concluded that newsprint can be recycled and remanufactured into newsprint five times with no change in fibre quality\textsuperscript{102}.

Swedish newsprint manufacturers are now importing recovered paper from Germany, Holland and the UK\textsuperscript{103}. In 1997, the average recycled content of newspapers in Western Europe was already 55.8%, climbing from 42.7% in 1993\textsuperscript{104}. In the USA, the recycled content of newspapers was 10% in 1989, climbing to 28% in 1997\textsuperscript{105}. In order to increase the consumption of recycled newsprint, 12 US states have mandated recycling requirements, and 14 have voluntary commitments. Many of these states have already achieved 30 to 50% recycled content of newsprint\textsuperscript{106}. In all major markets, individual frontrunner companies have already achieved much higher levels than the goals set by governments (see Box 3.6 and 3.7).

Switzerland’s largest newspaper, Blick, contained 85% recycled content in 1997 compared to 50% in 1992\textsuperscript{111}. Hans Strickler, responsible for the environmental aspects of the Ringier Group in Switzerland, clarifies: “One of the reasons for the fast development are the environmental targets of Ringier with a clear policy for these aspects. Other reasons are certainly the increasing capacity of the newsprint mill close to the printing plant as well as lower costs of recycled newsprint compared to newsprint from original fibres. And not to forget: the quality of recycled paper opens new marketing and product approaches for customers\textsuperscript{112}.”

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**Box 3.7 Recycled content in newspapers in North America**

By the year 2000, newspapers produced in New York State must contain at least 40% recycled content\textsuperscript{107}. Quebec mills are beginning to turn the tables by harvesting the heaps of used newspapers from New York. The Quebec newsprint mills are close enough to the urban forests of New York to make processing recycled paper an immediately viable proposition\textsuperscript{108}. In 1989, only one newsprint mill in Canada was capable of recycling. Today there are at least 23 with newsprint-recycling capacity and 62% of Canadian newsprint now contains some post-consumer fibre\textsuperscript{109}.

Krüger Paper Company, the fifth largest producer of newsprint in North America, based in Canada, has established a 220,000 tonnes per year facility in New York. The New York Post, which consumes about 80,000 tonnes per year, is now moving its printing installations to the Krüger plant\textsuperscript{110}.

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\textsuperscript{102} IFP 1997.
\textsuperscript{103} Warmer 1997.
\textsuperscript{104} CEPI 1998 and pers. comm. Carlos Reinoso, Director Recycling CEPL.
\textsuperscript{105} Newspaper association of America (NAA) 1998.
\textsuperscript{106} American Forest & Paper Association and the Newspaper Association of America. State Newsprint Content Requirements and Agreements. 1 September 1997.
\textsuperscript{107} Op cit. In the US 12 States have mandated requirements regarding the consumption of recycled newsprint. 14 states have voluntary commitments. The target is usually 40 or 50% recycled content in 2000.
\textsuperscript{108} May 1998.
\textsuperscript{110} May 1998; Hershkowitz 1998.
\textsuperscript{111} Ringier 1997; May 1998.
\textsuperscript{112} Pers. comm. Hans J. Strickler, Managing Director for the printing activities of Swiss publisher Ringier and responsible for the environmental aspects of the Ringier Group, 4 November 1998.
In the early 1980s, the UK newspaper publishers were importing as much as 90% of their newsprint from Canada and countries in Scandinavia. The UK is the second largest market for Canadian newsprint after the USA. In 1996, a quarter of all UK newsprint imports originated from Canadian manufacturers.\(^{113}\)

The UK is unique among European countries in setting a voluntary target for the recycled content of newspapers, encouraged by the government.\(^{114}\) In 1991, the newspaper publishers collectively agreed with government to increase the average recycled content in newsprint from 27% (1990) to at least 40% by the year 2000.

Reflecting this commitment, two companies, SCA (a forest products company based in Sweden) and Mondi Europe made the decision in 1993 to built a new £250 million (around US$ 380 million) advanced paper recycling and manufacturing facility in the UK. An additional grant of around £20 million (around US$ 30 million) from the UK government provided a substantial help. The new factory was opened in 1995, producing 370,000 tonnes a year of premium grade recycled newsprint, based entirely on recovered paper. The newspaper publishers were able to meet the government’s target of 40% four years ahead of schedule.

Aylesford newsprint is Europe’s largest producer of 100% recycled newsprint. According to SCA’s President, Sverker Martin-Löf, Aylesford has “proven itself as a first class cost efficient newsprint mill and it proves the point that newsprint needs to be produced locally to the market it operates.”\(^{115}\)

Despite the increase in recycling production capacity in the UK in recent years, every year around 1.4 million tonnes of used newspaper and around 450/500,000 tonnes of used magazines still end up in landfill. A study (commissioned by Friends of the Earth, Wastewatch, the Community Recycling Network and Avon Friends of the Earth) found that an average of 80% recycled content would not strain current technical limits, with improved technology increasing this a little further. The study recommends that the industry set a three-phase target, leading to 80% recycled content by 2010. This would allow the production and recovery businesses 12 years to respond. Since the voluntary target was met in 1995, the UK Government has been in discussions with the British newspaper industry and is “determined to see an increase in the amount of recycled newsprint used in newspapers” beyond the 40% target.

Ongoing investment in recovered paper use by the Shotton newsprint mill (owned by the Finnish company UPM-Kymmene) will bring the recycled content up to roughly 50%. Aylesford Newsprint is considering further expansion in production, by around 650,000 tonnes, in the next few years, bringing total consumption up to around 800,000 tonnes annually, which could potentially bring the recycled content closer to the 80% goal.

3.6 TREE-FREE PAPERS

There are at least 300 paper mills worldwide which use tree-free fibres, mainly from agricultural residues, for paper production.\(^{117}\) They account for some 7% of all fibres used for paper making worldwide. Production is based primarily on straw (46%), sugar cane waste (‘bagasse’, 14%) and bamboo (6%). The remainder consists of kenaf, hemp, flax, cloth and jute. Over three-quarters the tree-free paper in the world is made in China.\(^{118}\) Hemp and hemp straw paper is already produced and marketed in Germany, Spain, France, the UK, the USA and Canada. Most mills are small and serve regional markets. A globally significant mill is owned by Saica in Zaragosa, Spain, which produces testliner and fluting, with an annual straw capacity of 120,000 tonnes.\(^{119}\) In Germany hemp farming is now allowed and production is expanding. In the USA, the company Crane Co. has been printing on cotton rag pulp paper for 100 years. They have recently started up their Continuum line, which contains hemp in kenaf fibres. Crane Co. also has a line called Denim Blues, paper which is made from old blue jeans and recycled US currency! Like recycled paper, many of the

\(^{114}\) CAG 1998.
\(^{118}\) Paavilainen 1998.
\(^{119}\) Op cit.
hemp and straw-based paper producers have overcome initial problems with supply and quality. Non-wood pulps can replace wood pulp in almost all paper and board grades. However, as wood pulp has for many years been the dominating paper-making fibre, research and development has focused on improving wood pulp technology to increase price/quality and environmental standards. This has left the potential of tree-free fibre resources for paper production severely under-valued. There are, however, important benefits to tree-free paper production:

- Paper recycling has its limits: paper fibres break and become shorter when recycled. A closed recycling system is therefore not possible: new fibres are always needed. Tree-free fibres can be used for applications where the use of recycled paper has technical limitations, like the high print quality requirements of wood-containing paper for magazines.

- Kenaf and hemp are notable for their natural whiteness; they can be readily bleached without chlorine. They are grown quickly without - or with very limited use of - pesticides, fungicides or other chemicals. Moreover they can be integrated into a farmer’s existing crop rotation, preserving and revitalising the soil when planted in alternate growing seasons. Hemp and kenaf yields per hectare are approximately two to four times higher than pulp wood yields in natural forest.

- Using wheat and rice straws as a significant fibre source for paper (and board). Large areas of straw are currently burnt, creating pollution problems. Using this straw for paper and board production generates additional employment and income in rural areas.

Box 3.9 More demand for hemp pulp needed: Danforth

Danforth, based in the USA, is the world’s largest producer and supplier of non-wood fibre and pulp, and the world’s only supplier of hemp pulp outside of China. Frank Riccio, president of Danforth International, believes there is a lack of market demand. Despite being the world’s largest hemp pulp producer, Danforth is selling less than 1,000 tonnes a year and the company’s sales have not increased in 10 years.

120 Paavilainen 1998.
121 Götschinger L., Prof. Dr. Ing. Dr. h.c., Institut für Papierfabrikation (IfP), letter 27 October 1998: “With (uncoated and coated wood-containing) magazine papers the content of recycled fibres cannot exceed approximately 25% because of printability requirements.”
122 Ayres 1993.
123 Tolliver 1996.
124 US$ 35 versus $100 per tonne in the USA, 1996. Source: Arbokem 1996.
126 Tolliver 1996.
Paper from straw fibres

Straw pulp is an excellent alternative to tree-based pulp for newsprint, printing and writing papers, corrugated medium paper and liner board from ancient forest pulp. It is already being used for paper production in Canada, Spain, Italy, India and China. Straw-based board and paper production has had a poor reputation because of its polluting industries in the past, but several companies have succeeded in making straw-based processing industries environmentally friendly, while creating jobs and income in rural areas in the United States.

There is a great potential for expanding agri-pulp paper production. According to the Montana Straw to Paper Working Group, 2.5 billion tonnes of agricultural wastes are available around the world, often at costs well below those of wood. Generally, less than half of this fibre is needed to improve the quality of the soil. The remaining half could be converted to 500 million tonnes of pulp - 1.5 times the world’s current paper consumption.128

In terms of practical opportunities, the Native Forest Network have estimated that paper production from excess straw from Montana’s agricultural sector could generate jobs and incomes for some 50 small paper mills. Each mill would require an investment of up to US$ 30 million. Despite their consolidated investments in huge tree-based pulp and paper mills, large forestry-based paper industries are increasingly looking at the development potentials of alternative sources of pulp. Stone Container has agreed with a coalition of Montana environmental organisations that the company will study the economic and technical feasibility of using alternative fibres for its paper production. Weyerhaeuser Paper Company has completed a successful pilot project at its linerboard mill, using seed grass straw in corrugating packaging in Springfield, Oregon.129

Box 3.10 Straw-based paper: Arbokem

The paper company Arbokem has been a pioneer in straw-based pulp/paper since 1983 and has established a paper mill in Alberta, Canada. Its papers are composed of straw (45%), post-consumer waste paper (43%) and filler (12%), produced in a totally chlorine-free and effluent-free manufacturing process.

Arbokem’s paper series is being marketed as Downtown Paper. Al Wong, founder and co-owner of Arbokem says:

“...we’re essentially reinforcing the three R’s: we’re reducing the amount of trees that would be clearcut as well as the transportation needed to haul materials. We’re re-using waste paper and crop residues. And we’re recycling, because our dissolved straw and spent processing chemicals can return to the fields as fertiliser.”

127 Arbokem 1996.
128 Native Forest Network. Undated.
129 Stern. 1999.

Efficient wood use in residential construction: A practical guide to saving wood, money and forests. Natural Resources Defense Council (NRDC), New York, USA.

Renewable resources for building material. Peter Fraanje, IVAM Environmental Research, University of Amsterdam, The Netherlands.


Efficient Wood Use in Residential Construction. NRDC website: www.nrdc.org/nrdcpro/fpprog.html

Useful website addresses

APA, Engineered Wood Assn.
www.apawood.org/index.html

CanFibre Group
www.canfibre.com

FSC International
www.fscoax.org

FSC UK
www.fsc-uk.demon.co.uk

Greenpeace Forest Campaign
www.greenpeace.org/~forests

Haindl Papier
www.haindl.de/englisch/e-index.html

Kafus Environmental Industries
www.kafus.com

NRDC (Efficient Wood Use in Residential Construction)
www.nrdc.org

Osaka Gas
www.osakagas.co.jp

ReThink Paper
www.earthisland.org/paper/rtphome.html

SCA
www.sca.se

UK Paper plc
www.ukpaper.co.uk

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