PRIME MINISTER'S OFFICE
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Working group on the improvement of operating conditions of Finnish forest industries and the forest sector

Final report

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Abstract
On 15 November 2007, the Prime Minister's Office appointed a working group to prepare proposals for measures to improve the long-term operating conditions of the Finnish forest industries and the forest sector, including proposals for immediate action to secure the supply of timber in Finland. Mr Esko Aho, President of Sitra, the Finnish Innovation Fund, was appointed to chair the group.

The final report evaluates the medium and long-term challenges facing the forest sector and discusses its key success drivers. As a result of technological changes and the turmoil in the market, the forest industry and, consequently, the entire forest cluster is currently undergoing the biggest upheaval in its history. Even so, the working group finds that the forest sector can re-invent itself and create new growth opportunities, as in the past when it has undergone similar changes. In order to be able to renew itself, the forest industry's current business operations must, however, be profitable.

When evaluating the future of the Finnish forest industry, the working group formulated the following vision: *Wood is a valuable, renewable and recyclable material that is suitable for a wide range of optional uses. In the global economy, it represents a significant national source of added value and its exploitation will contribute toward solving the problems related to the environment and energy.*

The working group proposes a comprehensive development programme covering the entire forest sector that will focus on three priorities: the development and exploitation of forest resources; an increase in the added value available from wood; and the creation of operating conditions conducive to competitiveness. The point of departure in the development programme is that the success of the Finnish forest sector will, as in the past, be based on a high standard of competence and technology and the competitive edge provided by the forest cluster. Global demand for wood-based materials, now intensified by environmental and energy concerns, will create favourable conditions for the implementation of such a strategy.

The working group proposes that the Government formulate a policy programme focusing on the future of the forest sector. It would be designed to ensure that the development programme outlined by the working group for the forest sector will be implemented in all the administrative sectors and that private sector actors will also be truly committed to it.

Keywords
Forest industry, forest cluster, forest sector development programme, climate and energy policy, forest resources, transport infrastructure, education, forest management, forest ownership structure, forest sector entrepreneurship, functioning of roundwood markets, forest cluster administration

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TO THE PRIME MINISTER'S OFFICE

On 15 November 2007, the Prime Minister's Office appointed a working group to prepare proposals for measures to improve the long-term operating conditions of the Finnish forest industries and the forest sector and to increase the supply of timber in Finland in the near future. The term of office of the working group was extended to 30 October 2008.

Mr Esko Aho (President of Sitra, the Finnish Innovation Fund) was invited to chair the group. The invited members were Mr Jouko Ahonen (President, Finnish Paper Workers' Union), Ms Anne Brunila (President, Finnish Forest Industries Federation), Ms Suvi Anttila (Managing Director, Pöyry Forest Industry Consulting Oy, replacing Mr Rainer Häggblom for the Final Report), Mr Lauri Ihalainen (President, Central Organisation of Finnish Trade Unions, SAK), Mr Jussi Pesonen (CEO, UPM-Kymmene Corporation, Chairman of the Finnish Forest Industries Federation), Mr Antti Rinne (Chairman, Union of Salaried Employees, TU), Mr Antti Sahi (Director of Forestry Group, Central Union of Agricultural Producers and Forest Owners, MTK) and Mr Pekka Yli-Anttila (Research Director, Research Institute of the Finnish Economy ETLA).

The following were appointed permanent experts to the group: Mr Pentti Forsman (Economist, Bank of Finland), Ms Sirkka Hautojärvi (Permanent Secretary, Ministry of the Environment), Mr Velipekka Nummikoski (State Secretary, Ministry of Finance), Mr Aarne Reunala (Director-General, Ministry of Agriculture and Forestry), Mr Juhani Tervala (Director-General, Ministry of Transport and Communications) and Mr Vesa Vihriälä (State Under-Secretary, Prime Minister's Office). At the final stage of the group's work its secretaries were Director-General Raimo Luoma, Senior Advisor Reima Sutinen and Director Mikko Karvinen (all from the Ministry of Employment and the Economy).

The group submitted its interim report on 15 February 2008 as stipulated in its brief. In the report, the group presented proposals aiming to safeguard the supply of domestic roundwood and to improve the functioning of the roundwood market in Finland. The current final report presents an assessment of the challenges and success factors for the forest sector over the medium and long term.

The working group met 11 times for the preparation of the final report. In the course of its work, the group has heard several experts[1] and made use of existing reports.

[1] See list in Appendix

Having completed its final report, the working group respectfully submits it to the Prime Minister's Office.

Helsinki, 30 September 2008

Esko Aho
Chairman

Jouko Ahonen

Suvi Anttila

Anne Brunila

Lauri Ihalainen

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1 SUCCESS STORY OF THE FINNISH FOREST CLUSTER

1.1 Changes in the Finnish forest sector and forest industry – how have we arrived in the current situation?

The forest sector has played a key role in the post-war economic strategy of Finland. Economic growth was promoted by utilising forests more efficiently and by supporting wood-based export industries. The growth strategy had three dimensions.

First, intense measures were used to increase the annual increment of growing stock through the establishment of legislation and organisations designed to steer forest owners as well as improve the operation of the roundwood market. Peatland drainage and the construction of forest roads are good examples of such measures. The *second* cornerstone of the strategy was to raise the degree of processing in the forest industry. This was achieved by ensuring funding for massive investments and by supporting education and research in the sector. The *third* important aspect of the strategy consisted of trade policy measures that were implemented from the early 1960s on: the decision to joint the EFTA, the free trade agreement concluded with the EEC and accession to the European Union were all contributing factors in ensuring the access of Finnish forest industry products to the international market. Trade policy was aided by an exchange rate policy designed to safeguard the profitability of exports.

Three stages can be distinguished in the post-war development of the Finnish forest industry: a period of *expansion* from the end of the 1950s to the 1970s which was based on a growing roundwood supply and extensive investments; a period of *specialisation and centralisation* from the late 1970s to the 1990s; and a period of *globalisation* starting in the 1990s.

The period of expansion was characterised by a search for economies of scale and by a continual improvement of cost-effectiveness. As early as the beginning of the 1960s, production units constructed in Finland were among the largest in Europe. This was also a period of increasing cooperation with the mechanical engineering industry: new technologies were developed in cooperation with Finnish mechanical engineering companies with the aim of attaining technology leadership and improving the cost-effectiveness of production. The core of the Finnish forest cluster thus emerged as a result of cooperation between the forest and mechanical engineering industries. Expanding production volumes of the forest industry gradually led to a shortage of pulpwood. In spite of

programmes for forest improvement, the supply of roundwood on the market was not on a par with the volumes promised by annual growth. From the 1970s, the shortage was partly met by the adoption of mechanical pulp in paper manufacture. Although this did increase the fibre supply, it also increased the consumption of energy.

An efficient energy sector and low energy prices gave a relative competitive edge to Finnish production. Efficient utilisation of raw materials also involved the construction of large-scale integrated production capacities in the forest sector – the location of sawmill and paper production facilities in the same industrial complex brought logistical advantages and also ensured the efficient utilisation of the mill's by-products. However, it may also have slowed down the development of mechanical forest industry elsewhere than in major corporations.

The period of intensive centralisation and developing specialisation in the forest industry took place in the 1980s as a response to increasing competition in the export market. Mergers and acquisitions were used to gain economies of scale in risk tolerance, funding and also roundwood supply. Most of the potential economies of scale in production had already been used up, but more could be gained by investing in latest technology. Finnish forest industry was actually able to keep its productivity growing faster than its competitors. In the course of the 1980s, companies as a rule abandoned diversification and cut down on operations extraneous to their core competencies. One result of these changes was a marked decline in the number of jobs in the sector. At the same time, companies began an intensive process of internationalisation through corporate acquisitions abroad.

The 1990s was a period of globalisation. Over one half of all investments by forest industry companies were made abroad, and the ownership of the companies also became more international. At the beginning of the 2000s, more than one half of the personnel of forest sector companies were abroad, about 60% of their shares were in foreign ownership, and over 40% of their R&D as well. As a result of this internationalisation, the three largest forest industry companies of Finnish origin are today major conglomerates in the sector: they are all among the ten largest forest industry corporations in the world. A quarter century ago, the largest Finnish company was number 38 on the world list.

Considering the entire post-war period, the strategy based on the utilisation of forests appears very successful. Economic growth and the growth of income have been rapid. The forest sector has played a major role in this, both directly

and indirectly. The Finnish success story lasted for several decades, during which time income from forests made a significant contribution towards the creation of our current learning society and welfare services. Additionally, an enormous amount of competence has emerged around the forest industry in the metal and chemical industries as well as in consultation and planning services. The Finnish forest cluster is indeed an exceptional phenomenon in the world.

The operations of the forest industry and the entire forest sector are for the most part based on a model created in the 1970s: efficient production, application of latest technology, development of expertise and strengths created by the forest cluster. The export prices of Finnish forest industry products and the profitability of companies in the sector held their own up to the beginning of the 2000s, at a time when the prices of many raw materials and those of raw material intensive products were falling.

In the course of the 2000s, however, the forest sector has entered a period of upheavals, nowhere better manifested than by the profitability crisis of the forest industries. The Finnish forest industry is in the greatest period of change in its history, a development exacerbated by the imminent end of roundwood imports from Russia. The reasons of the crisis go deeper, however: rapid technological development that has reduced the demand for many paper grades, and changes in the market that have shifted the growth of the paper market away from the market areas where Finland has traditionally been a strong player.

1.2 Change drivers of the forest sector

Technological development and market changes

The position of the forest sector and that of the paper industries in particular on the global market has changed as a result of technological development and changes in competition and demand structure. Electronic communications have in the 2000s increasingly begun to replace paper-based communication, as a result of which growth in the demand for many paper grades has stopped or even gone into decline in Western Europe and North America. The market has clearly divided into two: the growing market in Asia and also in eastern parts of Central Europe, and markets of slow growth, falling prices and over-capacity, largely in developed countries.

Paper for mass communication has accounted for a significant part of global paper production, about 40%. Ideas about the effects of ICT on paper consumption

have changed gradually. The shift towards electronic communication has been relatively slow, but the trend has been clear. Gradual change is seldom met early enough and with sufficient strength; this was the case also in the forest industry. Consumption of newsprint in the USA has declined over the past 20 years to a stage where consumption in absolute terms is now on the same level as in 1965, and per capita consumption on the same level as in 1946. Real prices have fallen about 70% from 1970. The decline in prices and consumption is expected to continue for quite some time. Western Europe tends to follow developments in the United States with a delay of 5–10 years.

The key question for the future is the growth of consumption in developing markets, such as China and India. Only a fifth of the world population currently has access to the Internet, and an increasing prevalence of access may significantly reduce paper consumption in the future. Paper producers are therefore not only in competition with each other, there is also competition between paper and electronic communication. The low and still falling cost of electronic communication also places a continuous pressure on the price of paper.

Even if the growth of paper consumption for communication were to slow down in developing countries, the consumption of other paper grades and in particular of advanced packaging materials will increase as income levels rise. The growth of paper production has for quite some time been strongest in Asia and that of pulp production in South America, where also Finnish companies have invested. The global pattern of competition has changed crucially, with companies and countries that were traditionally strong competitively having lost their market shares. The competitive edge of new actors is to a significant degree based on lower raw material and other costs, as well as the fact that they are spared any extra costs occasioned by climate policy.

Studies show that competition in the world paper market is such that European paper companies are unable to pass increasing costs to prices. Essentially the situation in the world market for pulp and paper is one of where the law of one price rules, that is, the prices of products are more or less the same, discounting differences in currency and transportation costs. Because of this situation, European forest industries are unable to transfer additional costs from internal emissions trading in the EU to the prices of their end products, contrary to what was anticipated when the emissions trade mechanism was set up.

Owing to softening prices, higher costs and over-capacity, the profitability of European and North American producers has for a long time been poor.

As a result of globalisation, the pressure towards price convergence of cost factors – energy, raw materials, intermediate products and even labour in part – is growing. Even the factor market – not just the product market – is more fiercely competitive than before. As a result, the competitive edge of the Finnish forest industry too has changed or is changing in many ways. For instance, in the long term we will be unable to maintain our competitive edge based on lower energy prices.

On the other hand, many **existing competitive advantages** created in the past few decades are not without significance, even in the new global operating environment. These advantages include the valuable and *high-quality wood fibre, expertise* and *a strong forest cluster*, which amount to a unique complex comprising the core competencies of the forest sector with related companies and segments of the economy. The Finnish forest industries are also in the process of acquiring **new competitive advantages**, the utilisation of which is enhanced by globalisation. These advantages derive from new ways of using wood and from creating added value through the application of solutions based on information technology, biotechnology and nanotechnology.

Competition for natural resources

In spite of social and technological advances, humankind is increasingly dependent on natural resources. Along with population growth and a higher standard of living, the value of soil, pure air and water, energy sources as well as fibres and metals have all grown.

Estimates on the depletion of most non-renewable resources vary, because in addition to existing reserves, their supply is affected by such factors as technological development, recycling, environmental or health-related restrictions on their use, as well as geopolitical interests. In contrast, the use of renewable natural resources is known to already exceed the annual production capacity of the planet. Geographical differences are, nevertheless, considerable, as are differences between the natural resources themselves. Ecosystems are under serious threat in some regions, in others the use of renewables can even be increased without compromising sustainability. For instance, only one half of the annual increment of growing stock is currently used in the EU. According to the Finnish National Forest Programme, the utilisation of forests in Finland too can be increased considerably without putting sustainability at risk.

Many natural resources are site-specific, which means that land use will in the future become an object of particular interest and contention. The land area of Earth is limited, and there are many takers for productive land. For example,

global rise in the standard of living leads to an increase in the demand for meat, and thereby for arable land. Increasing efforts by many countries to make the transition from oil-based economy to a bio-based one will increase the demand of biofuels, which too will in turn increase the need for arable land. At the same time, the demand for wood-based products will also increase, further accelerating the competition for land, a scarce resource.

The area of unused arable land on Earth is only about 250–300 million hectares, equivalent to the area of Argentina. This is considerably less than would be needed to satisfy humankind's growing needs. Even the current area of productive arable land is decreasing constantly due to droughts, desertification and construction. Competition between different forms of land use and between the production of different natural resources is accelerating continuously.

Changes in relative prices steer land use in the long term to different purposes. *Wood and wood fibre will in the next few decades become scarce*. This scarcity will be the greater, the stronger economic growth is and the more the use of non-renewable energy sources is limited. Currently there are unused wood resources at least in South America, Russia, Africa and also South East Asia.

Scarcity can be alleviated by using land more efficiently and by improving material efficiency and productivity. Countries with abundant and high-quality forest resources will gain new opportunities in the future marketplace.

At the same time, the economic, technological and political links between different natural resources and their use will become increasingly complex. Social and political interest in the use of natural resources has increased considerably over the past few years. The EU drew up its own Natural Resources Strategy in 2005, and in 2007 the UN launched an International Panel for Sustainable Resource Management. Like the IPCC, the purpose of the new panel is to bring together global expertise in support of the natural resource policy of the future. The preparation of a National Natural Resources Strategy was launched this year in Finland, one of the first countries in the world to do so.

Energy policy and climate policy

Energy policy instruments and carbon dioxide emissions trading aiming to mitigate climate change are expected to have a powerful impact on increasing the use of forest chips and other wood biomass in energy production. Wood already plays an important role in energy production in Finland. A major contributing factor to the high share of renewable energy in energy consumption in Finland is wood-based energy generated internally by the forest industry.

Of all wood used in Finland, about 40% is used for energy production. Those parts of roundwood that cannot be used for higher processing are required to be used for energy production.

Under the EU energy policy targets published in January 2008, Finland is required to increase its share of renewable energy sources from 28.5% to 38% of total energy consumption by 2020. The Union also aims to increase the share of biofuels to 10% of total fuel consumption for transport by 2020.

Realisation of this target has increased concern within the forest industry over roundwood supply, and over the rising cost of raw material in the pulp and paper industry. On the other hand, interest within the forest industry in the production of biofuels has also increased. One threat to the profitability and competitiveness of the sector is that, after 2013, emission allowances in the emission trading system will be auctioned, which will entail considerable additional costs to European pulp and paper industry. Emission trading will also increase the market price of electricity and introduce additional production costs in Europe.

Only one third of the pulp and paper products in the world are subject to emissions trading. When product prices are determined in the world market, competitors not subject to emissions constraints gain a cost benefit. The changeover from free emissions allocation to auctioning is estimated to bring additional costs of MEUR 125–300 annually. Moreover, the increase in the price of electricity due to emissions auctioning is estimated to increase the production costs of the forest industry in Finland by MEUR 105–320 a year.

Carbon sequestration by trees and the life-cycle properties of forests are a positive competition factor. Prevention of forest destruction will in fact be a major and cost-effective method for mitigating greenhouse gas emissions. The role of forests and wood-based products and their position in climate policy are determined in international climate negotiations. The main thing is that the ground rules will support sustainable forest management.

1.3 Working group's vision

In its assessment of the future of the Finnish forest industry, the working group has devised the following vision: *Wood is a valuable, renewable and recyclable material that is suitable for a wide range of optional uses. In the global economy, it represents a significant national source of added value and its exploitation will contribute toward solving the problems related to the environment and energy.*

The working group estimates that the crisis of the forest industry is a case of painful, but inevitable renewal. The entire forest sector is evolving and developing new modes of operation, just as it has always done in the past. The forest industry will have to adapt to the changed operating environment and to develop new ways to operate that are suited to the new situation. A factor which makes this adaptation particularly challenging is that, in order to be able to change, the current operations of the industry must be profitable. Renewal also requires long-term investment in the development of expertise and multiple competencies.

2 DEVELOPMENT PROGRAMME

Realisation of the working group's vision calls for determined and sustained development of the forest cluster, and also for increasing cooperation between the forest cluster and other sectors. The group has decided to present a broad long-term development programme that requires commitment by all actors to its realisation, and also for sufficient resources both from the private and the public sector.

The development programme has three priorities: development and economic exploitation of wood resources, increasing added value from wood, and development of the general operating environment in a direction that supports the renewal of the forest sector.

2.1 Forest resources and their economic exploitation

The Government accepted the Finnish National Forest Programme 2015 as a Government Resolution on 27 March 2008, and simultaneously also the Forest Biodiversity Programme for Southern Finland 2008–2016 (METSO). The Forest Programme aims to maintain the annual increment of Finnish forests on a minimum level of at least 100 million cubic metres per year (98.5 mill. m3 in 2006), and to improve the wood production capacity of forests. Measures to attain these goals include increasing the amount of forest management and reconditioning works, improving the quality of forest regeneration and the tending of seedling stands, and increasing fertilisation for health and growth. Improved management measures as set out in the programme would enable yield potential to be increased in a sustainable manner to 65–70 million m3 annually, which is about 10–15 million m3 higher than in the early years of the 2000s. Improving the state of forests and increasing yield potential are useful in all circumstances, but they are particularly important in the current crisis to offset reduced imports from Russia.

The working group agrees with the policies set out in the Finnish National Forest Programme, and considers them even more justified on account of the imminent scarcity of roundwood raw material, and also in order to sequester carbon in healthy, vigorous forests.

The working group presents the following development proposals for the development of forest resources and to promote their economic exploitation:

Transport infrastructure

A comprehensive and well functioning transport network will remain a basic precondition for the competitiveness of the forest sector and the entire Finnish industry also in the future. Logistics account for 15–20% of all expenses of forest industry companies.

The targeted increase in domestic roundwood supply for both industrial and energy use will highlight the importance of a well functioning transport network. Roundwood transport accounts for the majority of freight traffic over the low-volume road network in particular, including forest roads and other private roads as well as most of the rail network. Investments are also required for the improvement of water transportation routes.

In its interim report of 15 February 2008, the working group proposed considerable additional funding for the basic improvement and maintenance of low-volume road and rail network needed for timber haulage. In its framework decision from March 2008, the Government decided, largely in keeping with the working group's proposal, to improve parts of the road and railway network and water routes that are of importance for ensuring the roundwood supply, by increasing and targeting a total of MEUR 225 for the purpose in the period 2008–2011.

The decision includes EUR 5 million for the basic improvement and augmentation of the forest road network. Metsähallitus on its part has decided to use its own funds for significant improvement of the condition of forest roads on State lands.

There is a shortage of loading points and rolling stock capacity for roundwood transportation over the rail network. This will get worse as transportation of roundwood will increasingly take place by rail in the future. The need for more loading points of terminal type run by entrepreneurs and for rolling stock is pressing. Development of the terminal network must be integrated with the development of the road network.

> **The working group proposes that a separate report should be drawn up concerning the transportation investments needed for ensuring the operating capacity of the forest industry, including the development of water routes. This should be done so as to make the report available for the preparation of the Government Programme of 2011.**

Development of the methods of forest management and harvesting

Developing better methods of forest management and harvesting would improve the efficiency of the entire roundwood production and supply chain, and to improve the quality of these operations. In order to ensure future cutting potential, the volume of silvicultural works and first thinnings need to be increased in keeping with the proposals of the National Forest Programme. For example, the need for seedling stand management is 1.6 times and that for first thinnings 2.2 times greater compared to the volume over the past 10 years. Artificial regeneration is needed on about 160,000 hectares, seedling stand and young stand management on about 265,000 hectares, and ditch reconditioning on about 100,000 hectares annually. Owing to climate change, the risk of forest destruction may grow, a factor that must be taken into account in all forest management.

Harvesting circumstances in Finnish forests are extremely challenging in view of the need to increase fellings. There is not enough machinery suitable for high-quality harvesting on grounds of low bearing capacity in all seasons. Climate warming and shorter periods of ground frost further limit fellings with current methods. Stands that can be harvested and transported only during ground frost account for an estimated one fourth of all stands marked for cutting. The share of stands that allow harvesting throughout the year is about 10 percent.

Harvesting is today carried out with forest machinery whenever possible. The productivity and efficiency of harvesting cannot therefore be improved by increasing the level of mechanisation in harvesting. However, efficiency can still be improved by increasing the amount of time machinery is in use over the course of the year. Provided there are stands ready for harvesting throughout the year, suitable and available technology, and the roads are in good condition, wood can be harvested throughout the year.

The mechanisation of forest management works is still in its infancy. Mechanical seeding is already commonly used in forest regeneration, but there is still much to be improved in mechanisation. The mechanisation of seedling stand tending is only just beginning.

The development of techniques for silvicultural works and harvesting need to be intensified also because of the declining availability of labour for these operations. On the other hand, mechanical all-season harvesting and management will create opportunities for more attractive, competitive and

permanent jobs in the forest sector than at present. Improving mechanisation will also provide Finnish machinery and equipment manufacturers new markets both in Finland and abroad.

Problems in forest management and harvesting are in part due to drained peatlands which produce about 25 million cubic metres, or one fourth, of the annual increment of Finnish forests. While the cutting potential is about one half of this, real cutting volumes have remained considerable less.

It is the working group's opinion that these forests could yield more pulpwood needed by Finnish industry than at present, if only ditch reconditioning and first thinnings could be carried out.

The working groups proposes that

- **a good standard of forest management and future cutting potential should be ensured by implementing measures that are in line with the National Forest Programme 2015. Additionally, it is important to set clear quantitative growth targets for roundwood production, and to harmonise national and EU support mechanisms in a way that they will promote those targets. It also needs to be assessed whether existing support mechanisms are such that they promote the attainment of the targets of the National Forest Programme.**

- **R&D funding should be directed to the development of harvesting technology suitable for soft lands and to the mechanisation of forest management.**

- **a new operating concept should be developed rapidly for increasing the volume of ditch reconditioning on peatlands and of first thinnings, one that will render them attractive and profitable for both forest owners and buyers of wood.**

- **measures should be developed which will ensure the supply of labour in the sector, and which will promote job opportunities the year round.**

Education

The current output volumes of education in the forest sector are not in balance with the needs of the labour market. In particular, the number of graduating forestry workers, forest machine operators and timber haulage drivers as well as professionals in bioenergy and mechanical wood processing is far too small to satisfy the need.

Increasing fellings, an increasing volume of energy wood harvesting and an increasing degree of mechanisation in forest management are all factors that increase the need for forest machine operators. The National Forest Programme 2015 and the Savotta 2015 programme estimate that the number of forest machine operators will grow from 5,000 to 7,000 by the year 2015.

In order to ensure the supply of professional workers, forest machine operators in particular, the working group proposed in its interim report that an additional appropriation of EUR 6 million be reserved for their training. The supplementary budget of June 2008 included EUR 4 million for the purpose. Forest machinery operator training for adults will be increased in 2009–2012 using labour market training schemes for adults and apprenticeship training with a total of EUR 17 million.

The additional investment has proved to be efficient. Some 430 students began forest machine operator studies this autumn, a figure more than 20% higher than in previous years. Furthermore, when the efficiency of forest machine operator training is improved using labour market training for adults and apprenticeship training, it is likely that the number of forest machine operators graduating will rise to about 550 new operators per year.

The working group considers it essential that education needs of the forest sector are monitored in a systematic and sustained way in the future. For this purpose, the National Forest Council will appoint a working group for expertise and acceptability in the forest sector.

Structure of forest ownership

A fragmentary structure of private forest ownership is a threat to a well functioning roundwood market, to the profitability of forest management and to the provision of efficient advisory services for forest owners. As a result of a prolonged trend of fragmentation, the average size of private forest holdings has decreased to 24 hectares, which is only about one half of the size of

holdings in our competitor country Sweden. In the near future, forests owned by the baby boomer generation will begin to pass on to the next generation. This carries the risk of exacerbating the fragmentation trend. At the same time, the attitude of forest owners toward forest management and the commercial utilisation of their holdings is changing.

The declining size of forest holdings leads to several problems. From the perspective of sales, stands marked for cutting are often too small to sell due to the small size of the holding. A single roundwood deal also involves considerable costs for both seller and buyer, and the per unit cost of transporting machinery for harvesting is higher. Secondly, management works, such as thinning and brush control, can be more costly than average on a small holding.

The target adopted in the National Forest Programme 2015 is to increase the size of private forest holdings to 50 hectares by 2050. The measures proposed to achieve this include:

- reform of the Inheritance and Gift Tax Act
- extending the scope of tax deductions for forest management
- cutting the length of time forests are owned by estates
- developing real estate and investment funds
- improving the structure of forest holdings through land consolidation
- developing jointly owned forests and increasing related communications and consultation services

Efforts to improve the ownership structure of forests using the above measures have been made over the years, but with poor results. Land consolidation has to some extent been used to improve the structure of forest holdings, and legislation on jointly owned forests has in recent years been reformed to make it more advantageous for forest owners who wish to establish a jointly owned forest or annex their forest to one. The forest taxation reform currently under preparation proposes to extend tax deductions for forest management so as to make 60% of the acquisition cost of a holding deductible (was formerly 50%), and the deduction could be made from the sales income of all the owner's forest holdings, instead of exclusively from income of sales from the purchased holding.

It is imperative that the target of the National Forest Programme is attained as soon as possible. This cannot be achieved by any single measure, because forest owners and their values are different and also because conditions vary across the country.

Without new legislative instruments the decline in holding size will continue. The system must be changed from the current model, which is conducive to fragmentation of ownership, towards one that will favour larger holdings. Legislative reform needs to be effected soon, as the baby boomer generation will in the near future start passing their property on to the next generations. New operating models also need to be developed that allow better utilisation of economies of scale in the management of small holdings and in roundwood trade.

The working group proposes the launching of a long-term programme for the improvement of forest ownership structure, to be carried out in cooperation between different ministries.

Information and advisory services

In order to ensure an even supply of wood, it is warranted to allocate resources to advisory services and the marketing of existing services. Advisory services should be targeted primarily into activating passive forest owners and into providing consultation for new forest owners. The interim report of the working group proposed that such activities should be launched without delay and on a broad front in all Forestry Centres. After the publication of the report, all 13 Forestry Centres prepared, in spring 2008, detailed action plans for improving the efficiency of their advisory services.

An increasingly significant proportion of forest owners are people who do not feel that the services provided traditionally by forest organisations meet their needs. Information about forest management and related advisory services must be developed in a way that takes into account the needs of forest owners who in practice have no knowledge of forest management.

The ongoing upgrading of forest resource data systems and forestry planning methods in the Forestry Centres must be speeded up. Cost-effective new services based on electronic data systems and information about the need for forest management measures must be passed on as rapidly as possible for the use of forest owners and, with permission from the owner, also to forest management actors who provide other services.

Forest services entrepreneurship

Logging and roundwood transportation have for a long time been handled by logging entrepreneurs in Finland. Other forest management works have not been taken up by entrepreneurs to a similar extent.

One solution might be to develop private forest service entrepreneurship that would offer a more diverse range of services required for the maintenance and management of forest properties.

The working group proposes that the Ministry of Employment and the Economy should launch a programme for the development of forest service entrepreneurship.

Taxation

Significant tax reductions in roundwood trade have been introduced in 2008 that have given a boost to domestic roundwood trade. However, the working group calls attention to the fact that these tax reductions are only for a fixed term and will expire at the end of 2010. Expiration of the reductions will yet again change the operating environment of roundwood trade. Provisions need to be made well in advance for the new situation.

The working group proposes that the working group preparing the overall reform of Finnish taxation should be given the task of preparing the reform so as to ensure that it will efficiently promote the management of forests and an even supply of roundwood.

The working group considers it necessary that the level of taxation for electricity generated by forest industry companies themselves and for their energy consumption must be made compatible with that in competitor countries.

2.2 Increasing added value

In spite of changes in the marketplace, the current products of the Finnish forest industry will still comprise the foundation of its business for a long time in the future. In addition to current paper and wood products, an internationally competitive Finnish forest cluster of the future will nevertheless manufacture new and diverse market-oriented innovative products that cover the entire value chain. Examples of such products include valuable substances or chemical compounds extracted from wood (biorefinery products), composite materials utilising wood or its constituent parts, smart products utilising fibre or wood, or comprehensive product systems for timber construction.

A competitive forest cluster of the future will be structurally flexible and efficient. The fractions of its raw material must be consciously used in the order of their value. The most valuable parts of the raw material must be used first so as to create maximum added value. The remaining, less valuable parts of wood must then be put to profitable use in other parts of production. The working group considers that this principle should be taken into account also in industrial policy.

Wood already plays a significant part in energy production as well as in the processes of the forest industry and in other segments of industry. The importance of wood in energy policy will in all likelihood increase in the future. Energy production must be increased as part of the processes of roundwood harvesting and industrial production without endangering the use of the most valuable fractions of wood for products of higher added value.

Wood is a versatile raw material that allows the production of several products that in the past have been made from other raw materials. For instance, wood-based biodegradable products can be used to replace materials that return slowly to nature, such as plastic, thereby preventing waste problems.

Foresight

Foresight activities in the forest sector have increased in the 2000s. As part of the implementation of the National Forest Programme 2010, the Future Forum of Forests in Finland has been operating at the Joensuu University. Future development of the forest sector and its operating environment and the change factors affecting the sector have also been a target of foresight study in many Finnish research organisations, consultancies, universities, forest industry companies and interest groups in the forest sector. The future of the

forest sector has also been addressed in the future reviews of other sectors of the economy closely connected to the forest cluster. Owing to the large number of actors in this area, foresight work has been considered fragmentary.

Foresight in the forest sector will remain necessary also in the future. Foresight work in preparation of changes in the operating environment can be used to create a foundation for future opportunities for economic operations based on forests. Foresight work is strategic work undertaken actively and collaboratively by various sectors of the economy, not merely linear forecasting of one specific sector.

The working group proposes that foresighting should be adopted as an active component of the development of the operating conditions of the forest sector, that the utilisation of foresight results should be supported, and that the strategic centre of science, technology and innovation in the forest cluster, Forestcluster Ltd., should assume the responsibility for coordinating foresight work.

Research and development

The Finnish forest sector is exceptionally diverse, also world-wide, which provides an excellent starting point for the creation of innovations. Yet up until recently there has been far too little investment in R&D in the forest sector.

In the past few years, the situation has begun to improve as a result of strategic choices of the companies in the sector, and also as a result of promotion by the Government. The operations of the strategic centre for science, technology and innovation (SHOK in Finnish) were launched as a broad-based cooperation between the State and the forest cluster. An annual amount of EUR 5–8 million has currently been earmarked for the operations of the centre. When the operations reach their full scale, various actors must in the future contribute to it even more, and in a sustained manner, some EUR 50–80 million annually.

There are two dimensions to the increasing R&D contribution of the forest cluster. On the one hand, the cluster must be able to respond rapidly to challenges arising from the changing needs of consumers, from climate change, and from environmental and energy issues; on the other, to be able to engage in a broad interaction with other sectors and technologies.

One sector that remains insufficiently utilised from the perspective of innovation policy is mechanical forest industries, wood products and timber construction industries in particular. Wood is the only renewable construction materials that satisfies the criteria of eco-efficiency and has a mitigating impact on climate change. A higher degree of processing of wood in interior architecture and construction would enable the creation of more added value as well as jobs. Finland has every opportunity of becoming the driving force in increasing the use of wood and timber construction.

Several projects have been prepared jointly by the State and the business sector that need to be launched without delay. Examples of such projects include the competitiveness programme for the wood products industry, the WoodFinland network project, and the implementation of the R&D strategy of the wood products industry, all currently under preparation.

In addition to allocating more resources nationally, it is important that the Finnish forest cluster should actively exploit European R&D resources. Universities also need to prioritise their research in favour of strategic basic research projects in the forest cluster. Cooperation with Sweden and other Nordic countries is practicable, especially in projects involving basic research. International lobbying is an important aspect of a broad-based innovation policy when new regulations and standards for the forest cluster are being drafted.

The competitiveness of Finland can be improved by increasing internationalisation, activating users and customers in development and innovation operations, and by investing boldly in creativity and design. Demand- and user-driven innovations in particular can be used to achieve long term global competitive advantages.

The working group proposes that university chairs in areas such as timber construction and architecture, packaging and printing technology and biorefinery technology that are necessary for the future of the forest sector should be secured domestically. Opportunities for joint research in areas not covered by research in the EU should be investigated on the Nordic level. On the EU level, opportunities presented by EU research funding should be used, and efforts should be

made to influence the content of EU research programmes by, among other things, participating in the preparation of the Eighth Framework Programme for research, to be launched in 2014. Forest sector related basic R&D funding for universities needs to be increased.

High-risk funding

The Finnish forest industry and other businesses based on the processing of wood produce new innovations and business ideas continuously. Often these have only a partial link to traditional operations in the forest sector, sometimes none at all. Forest sector companies are able to put only some of them into commercial use within their core business operations.

For such innovations emerging within the forest cluster to be put to use efficiently, new forms of high-risk funding must be adopted in the sector. The forest cluster and the capital investment sector have hitherto been unable to sufficiently utilise the innovations created within the cluster.

The working group proposes that the Ministry of Employment and the Economy should investigate without delay what kinds of new investment fund solutions or other arrangements must be made to ensure that innovations emerging within the forest cluster can be developed into new business concepts using venture capital.

Technological solutions have emerged and are continuously emerging in the forest cluster the adoption of which carries great financial risks, but also great potential. One example is biorefineries that make use of wood in multiple ways. Adopting innovations rapidly and on an industrial scale calls for investment in experimental units.

The working group considers it necessary that the public sector should make significant contributions to the construction of experimental units that utilise new technology.

2.3 Operating environment

Competitiveness of the Finnish forest sector arises first and foremost from the efforts of private sector operators. Public actors nevertheless have an important role to play in the maintenance and development of a competitive operating environment. During its work, the working group has identified the following development needs pertaining to the operating environment:

Equitable, global ground rules and international lobby

For the Finnish forest sector to be successful in the new global operating environment, international competition must be fair and transparent. This in turn calls for equitable and just international codes of conduct and strict adherence to them.

In the future, the State needs to ensure that international agreements and legislation in the EU will enable genuine competition in the world market. Among other things, this calls for the prevention of illegal logging and public subsidies that distort competition, free trade in roundwood and wood fibre, and uniform international and national standards. Public procurement must also have common and equitable criteria.

Opportunities presented by the many uses of wood need to be exploited and they must be integrated into international climate and energy policy. Well managed and thriving commercial forests are an excellent carbon sink. It is in the interests of Finland that international climate policy is developed from this perspective. This ecological viewpoint supports the sustainable commercial use of forests.

Environmental expertise within the Finnish forest cluster is of a very high standard. The cluster has the capacity to satisfy the requirements of the strictest standards better than its competitors. Environmental standards can therefore offer a competitive edge to the Finnish forest cluster, but only on the condition that rules are collectively agreed upon and are adhered uniformly across the board.

International lobbying at an as early stage as possible is crucial to ensure the future competitiveness of the forest sector.

Bilateral cooperation with Russia in the forest sector will be needed, in spite of the export tariffs on roundwood.

It is the working group's opinion that the views concerning the positive role of the forest sector presented herein must be taken into account proactively in negotiations concerning international climate and energy issues. A point that needs to be considered is whether sufficient human and financial resources are currently used for international lobbying.

Functioning of the roundwood market

The roundwood market has become very difficult to anticipate and the roundwood supply uncertain. It is hard to find a balance between the demand and supply of roundwood. Buyers are concerned over the continuity of supply and the price of wood compared to prices in competing countries. Sellers in turn are concerned over the demand and correct price of wood. Measures that increase trust in the market among buyers and sellers alike will also increase the demand and supply of roundwood and thereby the overall potential of using domestic wood.

This situation is exacerbated by the export tariffs on roundwood set by Russia. Negotiations on the matter have failed to lead to any results.

A stable and predictable roundwood market is an absolutely essential condition for the competitiveness of the forest sector. The working group considers it necessary to search for new ways to promote the stability of the roundwood market.

The working group proposes that the Government should appoint an independent committee to draft proposals for the improvement of the domestic roundwood market.

Energy

In addition to the availability of raw material and high expertise, the competitiveness of the Finnish forest sector will also in the future be largely dependent on the availability of energy at competitive conditions. Although it is clear that the future of the sector cannot be built on a supply of cheap energy, the availability of energy must be safeguarded in all circumstances through energy policy.

Efficiency of the administration and development of the forest sector

The public segment of the forest sector (Finnish Forest Research Institute, public administrative tasks of Metsähallitus, Work Efficiency Institute, Forestry Centres and Forestry Development Centre Tapio) has currently about 2,200 employees whose salaries are paid from budgetary funds. Annual State funding accounts for about EUR 90 million. Additionally, about EUR 60 million of forest improvement funds are used annually. Among major actors in the sector are the 136 Forest Management Associations which receive annually about EUR 30 million for the promotion of forest management; the money comes from tax-like fees paid by forest owners. The Forest Management Associations employ about 1,100 people. The associations also play an important part in the roundwood trade.

In the forest industry, the main role of the State is provider of funding for research and development. Total R&D funding for the forest cluster from the National Technology Agency of Finland TEKES, and for VTT Technical Research Centre of Finland, KCL and universities, was about EUR 90 million in 2006. Additionally, SMEs in the forest sector received funding for development work through the Employment and Economic Development Centres.

Administration in the forest sector also includes education and training in forest management and forest industry under the Ministry of Education (universities, polytechnics, other education institutes) and matters pertaining to forest biodiversity, land use planning and environmental permits of the forest sector, which come under the domain of the Ministry of the Environment and the Regional Environment Centres.

The largest personnel within central State administration is in the Ministry of Agriculture and Forestry (about 30 people). Experts on the forest sector are also found in other ministries.

The degree of efficiency to which there public sector resources are used is a major factor in the competitiveness of the Finnish forest sector.

> **The working group proposes the preparation of an external and independent assessment of the functioning and development needs of administration in the entire forest sector.**

2.4 Reform of decision making

Forest sector affairs are handled in several administrative sectors of the State. The key actors are Ministry of Agriculture and Forestry, Ministry of Finance, Ministry of Employment and the Economy, Ministry of Transport and Communications, Ministry of the Environment, Ministry of Education, Ministry for Foreign Affairs as well as numerous agencies and organisations in the ministries respective administrative sectors. Operations are also coordinated by the National Forest Council in conjunction with the implementation and monitoring of the National Forest Programme, and lately also under the Forest Cluster 2030 strategic project of the Ministry of Employment and the Economy. The fragmented decision making needs to be consolidated.

The working group proposes that the Government should prepare a policy programme focusing on the forest sector to promote the implementation of the development programme for the forest sector.

The working group proposes that, in conjunction with the reform of the tasks of the Cabinet Committee on Economic Policy, the development programme for the forest sector would be adopted as one of the main targets of monitoring and decision making in the near future.

3 THE FOREST SECTOR – SECTOR OF THE FUTURE

As a result of technological changes and turmoil in the market, the forest industry and, consequently, the entire forest cluster is currently undergoing the greatest upheaval in its history. Even so, the working group finds that the forest sector can re-invent itself and create new growth opportunities, as in the past when it has undergone similar changes.

This view is based on the fact that there is a global shortage of wood fibre, and also that wood-based products contribute positively to the solution of many problems concerning the environment and energy. Forest resources and the availability of roundwood must therefore be safeguarded.

The success of the Finnish forest sector is based on high expertise and technology, and on a robust forest cluster. Considerable increase in resources for research is needed in all areas of the forest sector. This change is already on the way.

The main responsibility rests naturally on private companies, and growth areas and products will be determined in the marketplace. The functions of the public sector involve the construction and maintenance of the infrastructure, education and research, and to ensure that Finnish production has equitable operating conditions in the international market.

APPENDIX

Persons heard for the preparation of the final report

1. Suvi Anttila, Pöyry Forest Industry Consulting Oy: Mega-trends affecting the forest industry (5.5.2008)

2. Anssi Niskanen, Future Forum of Forests in Finland: Needs for renewal in the forest sector] (5.5.2008)

3. Eeva Hellström, Sitra: Natural resources strategy programme of Sitra (21.5.2008)

4. Anne Brunila, Finnish Forest Industries Federation: Investments in the forest industry in new products and modes of operation (21.5.2008)

5. Lauri Hetemäki, Finnish Forest Research Institute: Electronic communication and the market for paper products (3.6.2008)

6. Anne Brunila, Finnish Forest Industries Federation: Research strategy of the wood products cluster and organisation of joint research (12.6.2008)

7. Sirkka Hautojärvi, Ministry of the Environment: Climate policy and environmental developments as opportunities for the forest sector (12.6.2008)

8. Ali Harlin, VTT: Alternative use for forest biomass (12.6.2008)

9. Mr. Sten Nilsson, IIASA: Global forest industry (4.9.2008)

10. Mr. Karl Aiginger, Austrian Institute of Economic Research, WIFO: Globalisation and global economic prospects – challenges for small economies and national policies (4.9.2008)

11. Mr. Nebojsa Nakicenovic, IIASA: Global energy perspectives (5.9.2008)

12. Mr. Jaakko Jokinen, Pöyry Forest Industry Consulting: Future scenarios 2020 for Finnish forest industry (5.9.2008)

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