

# **The Contribution of Finland's Forests to National Prosperity and Wellbeing in 2015**

## **A Report on Finnish Forest Sector Development and Future Scenarios**

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### **A Summary**

## **Abstract**

In autumn 2005 the Ministry of Agriculture and Forestry began the background work necessary for revising Finland's *National Forest Programme 2010*. At the same time it was known that the Government would be requiring all ministries to prepare an outlook report by the end of July 2006. The Ministry of Agriculture and Forestry accordingly commissioned the Finnish Forest Research Institute in autumn 2005 to prepare a background study on the future of the forest sector. Three objectives were set for the work: the first was to prepare an assessment of trends in the forest sector's operating environment up to about 2015; the second was to identify alternative future scenarios; and the third was to give a preliminary outline of the policy measures required for each of the scenarios. The aim of the Finnish Forest Research Institute's work was not to set policy guidelines but to prepare a background study as a basis for the outlook report to be published later by the Ministry of Agriculture and Forestry.

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## Introduction

The Finnish forest sector is in a period of transition due to recent and anticipated changes in the global operating environment and in the Finnish economy and society at large.

The forces driving change in the forest sector have continued to gather strength since the first signs appeared in the 1990s. These changes are challenging the forest sector to exploit the opportunities for enhancing the contribution of Finland's forest resources to national prosperity and wellbeing. The future scenarios outlined in this report demonstrate that by developing existing and new uses for the nation's forests it will be possible to generate a greater diversity of prosperity and wellbeing for society as a whole.

The report analyses key changes set to occur in the forest sector operating environment mainly over the next 10 years. Based on this analysis and the need to take account of the changes identified, two alternative scenarios are highlighted for the development of the Finnish forest sector. The occurrence of any substantial sudden changes in the operating environment may also affect the extent to which either of these future scenarios materialises. Three such sudden changes are outlined against which it would be prudent to make provision. Finally, an appraisal is given of the type of strategy and policies that could be used to promote each of the future scenarios.

The aim of the work has not been to set policy guidelines but to analyse different alternatives as a background to the decision-making process. Hence the report does not present any common forest policy goal or vision. Goal-setting is considered part of the political process and not the domain of researchers.

In this summary, the changes in the Finnish forest sector operating environment, analyzed in great detail in the actual report, are not discussed. Instead, the focus is purely on the scenarios and policy measures. The scenarios, however, are based and reflect the analysis of the operating environment.

## Future scenarios for the forest sector

The response to changes in the forest sector operating environment can take many different forms. Two possible scenarios have been selected here and are titled ‘developing existing structures’ and ‘active change’. Within each scenario the adjustment process may vary significantly.

### Future scenario 1: ‘Developing existing structures’

This scenario is based on the following assumptions. The existing structures and modes of operation are considered successful and safe and no attempt is made to actively modify them. The risks of change are emphasised more than the risks associated with the existing structures. To ensure the development of existing structures, rational and necessary adjustments will be made in response to changes in the operating environment and in line with relevant agreements (EU Directives, international and national agreements and obligations). Some of the key features of this scenario are summarised below.

- The strategy followed by the *paper industry corporations* will be to increase the profitability and productivity of their existing production units in Finland and to expand production in Asia, South America, Russia and Eastern and Central Europe, as well as Western Europe. Investment will be made in developing new wood-processing products (such as bioproducts, functional printing and hybrid media, and chemical and food industry related products), but they will not form part of the core focus of the strategy. The existing products will continue to generate a major share of the paper industry’s income in the coming decade, which will therefore restrain the enthusiasm for starting new areas of business. In addition, the strategy-based expansion into new markets on the basis of existing products and the short-term measures to improve profitability will both require considerable resources (capital, time and expertise), leaving little for developing new products and business models. Due to measures taken to increase profitability (e.g. closing inefficient units) and the concentration on higher value added products, and due to advances in technology, the pulp and paper industry’s production capacity for its existing products will not increase in Finland, although the industry’s turnover may in fact rise. Thus the pulp industry’s wood consumption is also likely to decrease in the period up to 2015. The impact of the industry’s decreased production on the domestic wood market will depend on how the reduction in wood consumption affects imported wood as opposed to domestic wood. A halving of wood imports, for instance, from their present level would lead to slight higher consumption of domestic wood.
- In the *wood products industry* profitability improvement measures will also mean a shedding of capacity and an increase in higher value added products. The profitability of basic sawnwood will not be as good in Finland as in Russia or Eastern Europe, or even Austria or Germany. Reductions in production capacity are more likely in the case of major corporations than small and medium-sized companies. Developments in the sector will be largely determined by the amount of investment abroad by major corporations, the targets for the rate of return on capital and the desire to focus on higher value added products. Small and medium-sized companies will play a more significant role in the wood products sector. However, in total the production capacity in the sawmilling industry will decrease in the period to 2015. The development outlook for the plywood industry in Finland is better than for sawmilling, and plywood production is set to increase as a result of various development measures. The

sawnwood and plywood industry's demand for wood is expected to decrease. With imported wood comprising a relatively small proportion of all wood consumed, even a possible reduction in the consumption of imported wood would not ensure that consumption of domestic wood remains at its current level.

- Growth will occur in the production and use of *bioenergy*. There will be a increasing market for bioenergy, and it will be supported through the Government's forest, energy and business policies. However, no significant structural change in these policies is expected in the time period examined. The increasing use of bioenergy will primarily be based on technologies already in use and on existing production sectors. Use of wood chips will increase considerably in the period to 2015. Thinnings wood (pulpwood) will also be directed for bioenergy use. The use of wood for energy purposes will mainly be in the form of combustion. Production of wood pellets will increase from the present level of about 300,000 tonnes up to one million tonnes, most of which will go for export. This will offer opportunities for sawmills and plywood factories to diversify the use of their by-products on a regional basis. There will be a slight increase in the production of electricity and district heating by the sawmilling industry. Use of tree stumps and felling residues will increase somewhat, due to their use in, for instance, industrial power plants and in district heating plants. The use of wood chips and sawdust in bioenergy production will intensify the competition with other uses of wood raw material, although the probable decrease in pulp industry production will correspondingly reduce the scarcity of the raw material. The pulp and paper industry's interest in biorefineries (biofuels, chemical products) will grow, but actual production will not be started up before 2015. Research and development input will focus on utilisation of forest bioenergy, and greater attention will also be given to evaluation of environmental effects.
- Attention will be given to ensuring that *wood production* is maintained in the longer term, even though the demand for industrial wood will probably decline. High-quality sawlogs, sawnwood and plywood will continue to give the wood products industry a competitive edge, and the production of large-sized and high-quality roundwood will remain a key aim of wood production. As the proportion of higher value added products grows, the availability of high-quality pulpwood will become more important for the competitiveness of the paper industry. The forest industry's consumption of domestic wood will be significantly below the maximum sustainable removal in the next few years. The supply of spruce sawlogs will nevertheless be somewhat scarce in certain districts, which could be alleviated by bringing forward final cutting in some cases and by favouring crown thinning in appropriate thinnings stands, and by the use of fertilisers. The supply of pulpwood and sawlogs may be reduced by the increasing demand for using industrial wood as energy wood too, the greater attention given to multiple-use forestry, changes in the structure of forest ownership and any reduction in imported wood. The situation could most effectively be eased by activating the supply of domestic wood. In the long term there may well also be new demands for wood as a renewable raw material.
- Action to improve the *profitability of forestry* in the case of non-industrial private forest holdings will include increasing the cost-efficiency of silvicultural and wood production measures by different means and measures to increase the average size of forest holdings. Factors improving the profitability of *forest ownership* will include new income-earning opportunities (bioenergy, nature-based and rural tourism). Development of the forest industry operating environment will include measures to ensure that wood can be brought to market at a competitive price and measures to

boost spruce production by fast-acting means such as fertiliser use. Sawlog pricing by quality and by stem will be further developed, as will real-time forest planning, purpose-designed wood procurement chains, and harvesting of thinnings and on peatlands. Attention will be given to maintaining the basic infrastructure, especially the minor road network. A solution to the labour shortage at the operational level will be sought through measures such as further education and training, encouraging career changes and promoting active recruitment, and by stimulating entrepreneurship. There will also be increasing opportunities for exporting machinery and technology related to harvesting industrial and energy wood and in the production of forest machinery and services connected with wood procurement chains.

- The supply of *nature-based tourism* services in Northern Finland will increase and become more diverse, which will add to income-earning opportunities and boost employment. In particular, international nature-based tourism to the area will grow and thus there will be a need to develop high-quality tourism environments. These changes will also bring ecological, social and cultural challenges, which will have to be resolved. In Southern Finland, *recreational use* will be emphasised in the vicinities of urban areas. The use of these local recreational areas will grow, and this will create a relative shortage of such areas. Competition among different forest uses for access to the country's forest resources will intensify, which will heighten the need for more effective coordination of the different uses.
- *Forest conservation* will proceed according to the programmes already agreed. In furthering forest conservation, the primary aim will be to encourage the wider use of practices of a voluntary and participatory nature that make use of forest owners' willingness to provide forest areas for conservation purposes. This could add considerably to acceptance of the measures to safeguard biodiversity, especially among forest owners, and could reduce the likelihood of conflicts over conservation. The METSO programme's voluntary conservation measures (nature values trading, competitive tendering, cooperation network) will continue and the funding for them increased to a certain extent. Conservation of forests in Southern Finland will increase by 2015. A reasonable degree of harmony will be preserved between the different forms of use and the various interests involved (wood production v conservation). Although the forested surface area under conservation will still not be sufficient in ecological terms, it will nevertheless be constantly growing. Conservation will have the effect of raising stumpage prices; the rise will be small in the case of pulpwood and a little more in the case of sawlogs. This possible impact of conservation on stumpage prices will nevertheless be less significant than that of other factors affecting the wood market at the same time (e.g. changes in wood demand and wood imports). The amount of unmanaged old-growth forest will increase, but these forests are not included in the conservation statistics.
- *Forest research* will be better coordinated. Cooperation between research institutes and between these institutes and the forest industry cluster will be intensified both nationally and internationally. The availability of wood raw material and new uses for wood will be supported by focusing on the priority areas of the Forest Sector Technology Platform, which is a strategic research programme at European level, and on the national agenda drafted on the basis of it. A centre of excellence for forestry and the forest industry will be set up, where research and educational and training organisations can together focus more intensely on R&D and which can also enable an increase in networking and cooperation among research institutions. The centre's R&D work would cover both new and existing products. In education and training, the

number of higher educational places will be reduced, while the training opportunities for operational personnel will be expanded.

- Fewer office staff will be employed in the *forest sector organisations*. Some of the functions of the publicly funded forest sector organisations will be transferred to forest management associations and entrepreneurs. The remaining functions will be rationalised and automated, and the labour input required for traditional functions will fall substantially. On the other hand, a number of new challenges will arise in cross-sectoral cooperation, international issues and rural business development, covering areas such as wood procurement, nature-based tourism, landscape management, planning, waterways issues and the various aspects of sustainable development. Transparency and information provision will increasingly be achieved via computer networks. Personnel costs will be reduced considerably through the use of new information technology in, for example, the collection of forest resource data (e.g. for regional forest programmes) and in electronic transactions.

## Future scenario 2: ‘Active change’

The basis for this future scenario can be summarised in the following statements. Many of the strengths that have shaped the existing structures and modes of operation are diminishing or no longer apply. Moreover, based only on the existing structures the forest sector would decline in the long run. Thus, the sector will invest in developing new products, services and business models. There will also be a readiness to take risks and to wait for results to materialise in the longer term. Change in the existing structures will be actively sought by means of R&D, appropriate policies, new business models and new emphases for the different uses of the nation’s forest resources.

- In addition to the existing companies, there will also be new enterprises and venture capital involved in developing new products, services and business activities in *the wood processing industry*. The changes in the operating environment will be seen to be such that it is worth taking risks in developing new products and business models, rather than sticking only to the existing ones. Corporate R&D investment in the development of new wood processing products will be significantly greater than at present. Other sectors of the economy (e.g. the chemicals, energy and communications industries) will also be interested in devoting more resources to products that are derived from wood. Biorefineries will be set up at pulp and paper mills and will concentrate on producing not only existing products but also using biomass to produce bioenergy, biomaterials and chemical products. These will enable the existing pulp and paper industry to improve its profitability and expand its business. The forest sector’s business activities will also be expanded and further diversified as a result of the use of electronic information and communications technology in packaging and paper products (functional printing and hybrid media), the production of food and chemical industry products based on wood raw material, and the development of new materials. Traditional forest industry products will be made alongside the new products, and it will be possible to vary their share of total production according to the prevailing economic situation. New products will also necessitate new business models: a company purchasing transport fuel, for example, is a different kind of customer than a printing house. The demand for forest biomass will grow considerably.
- The Finnish *wood products industry’s* market share in the domestic construction sector will remain at least at its present high level, thanks to active policies, development measures and reorganisation. Thus, as the economy grows, the domestic demand for sawnwood and wood-based construction will increase. Export growth will be largely dependent on the extent of demand for value added products and for components and related systems in construction, interior design, transportation and packaging, and the success of new innovative product and marketing solutions. Production growth will be possible in the case of products that are based on technological advances and know-how, especially value added sawnwood and plywood products. New product innovation opportunities include different kinds of physically and chemically modified wood products, wood/wood composites, composites of wood and other materials, engineered wood products and various intelligent and functional products. Production and the demand for wood will remain at least at their present levels due to the revised structure of the sector.
- The Government’s policy in support of *bioenergy* will be strengthened significantly, and new policy measures will be introduced. For example, government may impose an obligation concerning the use of biofuels, and their production will be supported

through selective tax subsidies. The same environmental and social sustainability criterion required of domestic wood will also be required of imported wood raw material (cf. Austria). The Government will commit itself to an intensive development programme on bioenergy technology in the period to 2015, and will provide the resources for such a programme. Research and development programmes will focus on areas such as biofuel production technology and prevention of adverse environmental effects. The use of forest-based bioenergy will increase much more than in the 'developing existing structures' scenario and will be based on both existing and new technological solutions and production plants. The use of wood chips, thinnings wood and sawmilling by-products for bioenergy purposes will increase significantly and their price will probably rise. A well-functioning market for energy wood will emerge, along with active business operators supplying not only the raw material but also energy and energy products. By 2015, the forest industry will have developed integrated systems for the procurement and use of industrial wood and energy wood, where the raw material finds its way optimally to the different end uses. The energy and chemical products industries will also have found uses for wood. The employment impact of forest-based bioenergy will be significantly greater than at present, and bioenergy technology exports will also be up and cover a wider range of products. The increased level of bioenergy production will bring new challenges for forest ecology and biodiversity. This may, in part, bring deteriorating conditions during the transitional stage, but considerably more resources will be devoted to seeking solutions to the problems.

- *Wood production* will be more efficient, thus enabling not only the existing use of industrial wood to be safeguarded but also allowing the growing need for energy wood to be met, and also improving the scope for taking account of the needs associated with forest uses other than wood production. The demand for wood may also increase due to new wood processing products. A fall in wood imports will result in greater demand for domestic wood, thus heightening the need to activate wood supply. The means to secure a sufficient level of wood production include the following: ensuring the appropriate extent and quality of seedling stand management and forest generation; achieving a significant increase in the amount of thinnings, especially first thinnings; and facilitating profitable investments in forest improvement, such as fertiliser use and ditch cleaning and supplementary ditching. These measures will also safeguard the conditions for wood production in the longer term.
- The *supply of wood* and *the profitability of wood production* will be aided through guidance and direct marketing and by improving the cost-effectiveness and standard of silviculture. It is accepted that forest owners have differing objectives, and so models will be created for efficient wood production and also for silviculture and forest management which take account of other forest uses. It will be possible to place the emphasis on energy wood and pulpwood production, high-quality sawlog production or other forest uses, depending on the circumstances. With the aim of promoting profitable wood production, encouragement will be given to establishing joint ownership units, generational transfers of ownership and forestry entrepreneurship. The pricing of sawlogs and pulpwood by quality and by stem will be developed so that it better corresponds to the value added. Harvesting technology will also be made more suitable for integrated harvesting of energy wood and industrial wood and for harvesting on peatland. Wood procurement chains tailored for different conditions will also be developed for both the domestic and export markets. An ecologically sustainable basis will be developed for energy wood production. The competitiveness of the forest industry will be maintained by ensuring that the right

operating conditions and infrastructure are in place. The condition of the minor road network will be improved and the rail network maintained and developed. In the forest sector as a whole, significantly more investment will be directed at research, development and education and training.

- In land-use planning, the establishment of *recreational and tourism areas* will be a common goal for both tourism and forestry. Grants will be provided from forestry funding systems for promoting recreational and landscape values. Tourism and recreational use will form a key objective in forest policy and regional forest programmes, and there will be more education, training and research to support the development of these uses. In Northern Finland, nature-based tourism will provide larger economic benefits than any other forest-based business. There will be many more tourism environments of a high quality in terms of their landscape and recreational values than at present. The supply of nature-based tourism services will also add to the earnings potential of forest owners, for example via land leasing and new entrepreneurship opportunities. In Southern Finland, the supply of recreational areas will meet the demand for them. People will find that they obtain more wellbeing and health benefits from the forests than they do today. Corporate and entrepreneur awareness of environmental values and the means for taking them into account will be improved through research, education, training and development. To reconcile and coordinate the different forest uses, new practices and models will be developed. For instance, landscape and recreational values will be taken into account more effectively in forest management.
- The aim in *forest conservation* and in forest management will be to achieve the objectives of ecological sustainability in forestry and preservation of the biodiversity of the forests. Attaining this will mean an increase in the direct and indirect costs of conservation. This higher level of conservation will nevertheless be seen as being in Finland's national interests, from the viewpoint of exports of forest industry products, and also from the viewpoint of the growing nature-based tourism business and people's recreational pursuits and general wellbeing. Conservation programmes will be expanded on state, municipal and corporate-owned land in Southern Finland in order to create larger and more coherent conservation areas. The range of voluntary conservation methods under the METSO programme (natural values trading, competitive tendering, cooperation network and forest environment management areas) will be increased, along with the funding for them. The cost-effectiveness of new conservation methods will improve because there will be a well-functioning market for conservation, where the demand financed by society and the desire of forest owners to offer sites for temporary or permanent conservation are brought together. Forest conservation in Southern Finland could therefore increase significantly by 2015.
- The *ecological sustainability of the forests* will improve as a consequence of the measures pursued under the METSO programme. On the other hand, forest ecology will also face new challenges on account of the increase in bioenergy use and more efficient forestry practices. Harvesting of felling residues and tree stumps for bioenergy purposes will lead to an overabundance of ground vegetation and changes in the nutrient balance, which may also have an impact on disease prevalence. In addition, there will be a reduction in the amount of decaying wood and in the number of species dependent on decaying wood in the forests. However, with more soil being broken up, there will be an increase in the biodiversity of vascular plant species. The health of trees and changes in the nutrient balance will be actively monitored in areas

where felling residues and tree stumps are removed for energy use. The problem of buttrot will be exacerbated in more intensively used forests. This fungus will spread particularly during clear cutting and thinnings conducted in summertime. If summertime felling extends to peatland, buttrot may also become a peatland problem. Buttrot is also likely to spread if measures to promote biodiversity include increasing the amount of reserved trees and/or encouraging their continued growth. The efficient regulation of elk and deer populations will be essential in order to limit damage to seedling stands.

- Forests and wood products will be used actively in efforts to control the effects of *climate change*. The aim will be to use forests and wood products cost-effectively as a carbon reservoir and to offer wood as an energy and material substitute. Compensation will be paid on the amount of carbon capture in forests, and the extension of this to wood products will also be investigated. Forest owners will obtain income on the amount of carbon capture in their forest holdings. Finnish policy will be to support international treaty arrangements that permit more comprehensive utilisation of the forests and the inclusion of wood products in carbon sinks. With carbon sinks for forests (and wood products), the aim is to offset part of the emissions reduction requirement and thus to reduce the cost of Finland's climate obligations.
- Considerably more of society's resources will be invested in *forest research* than at present, due to the Government's adoption of policies that emphasise know-how and innovation. At the same time, research will be undertaken more efficiently, for example by restructuring the system of research organisations, increasing the proportion of competitive funding, and seeking to discontinue research resource allocation based on regional policy criteria. Research on improving and customising wood materials and on finding new uses for wood will be extremely important. National resources will be allocated to research on materials science and wood-based construction and to green chemistry and biorefineries, on the basis of which networked organisation models (virtual institutions) will be established, where the beneficiaries of the results are also active partners. The research undertaken will be multidisciplinary and international. In forest improvement, in seedling stand production, in wood production and in plant protection there will be a greater focus on biotechnology and genetic technology. An increasing amount of international research cooperation will be undertaken, and one key area of interest for such collaboration will be Asia. Cooperation concerning North America will also be important on account of it having many similar structures and challenges compared with those in Finland.
- Finland is already currently an internationally significant *education and training* provider in the forest sector. In the period to 2015, an internationally competitive centre of forest sector education and training at the highest level will be established among Finnish universities and involving a number of polytechnics. In addition to relatively extensive technical education in wood processing, Finland will also have a solid education and training foundation in other sectors related to the use of forest resources. A strategy based on know-how and services will support the further enhancement of these. Development of this education and training will not be viewed solely in terms of the practical needs of operators in the forest sector; rather, research, education and training will be seen as representing an opportunity to expand the range of forest sector services and business activities in Finland and internationally. As a result, Finland's comparative strength and traditions in forest sector know-how will be utilised more effectively than before, including its expertise as a research, education and training services provider.

- With the objectives presented above, forest sector research, education, training and development will account for a growing proportion of the value added in Finland's forest industry cluster in the period to 2015, and will employ considerably more people than at present.
- Government resources for *forest sector organisations* and *forestry* will be more cost-effectively allocated and a higher share of this input will be targeted at generating public goods from the country's forest resources. Government funding will be given for activities performed rather than for meeting costs incurred by the forest sector organisations. This will in turn lead to structural changes in forest services, in that productive activity will be concentrated in local forest management associations and with entrepreneurs, while the operating sphere of Forestry Development Centre Tapio and the regional forestry centres will consist of statutory functions, general promotion and implementation of forest policies, training and group-based consultancy, and ordering productive inputs from elsewhere in society. Entrepreneurship will be encouraged by measures such as eliminating factors that restrict competition. In the work of the forest sector organisations, the emphasis will be on cross-sectoral cooperation with e.g. the environmental, energy, road and rail authorities and on coordination of the different ministerial domains.

## Anticipating sudden changes

The extent to which the future scenarios materialise could be affected by the occurrence of any substantial sudden changes in the operating environment. These could either be unforeseen changes or changes that were foreseen to a certain extent but which occurred more rapidly or more extensively than originally anticipated. Although such substantial sudden changes could take numerous different forms, the report considers three such cases.

The change labelled '*halving of the consumption of imported wood*' is based on the assessment that wood imports to Finland could decrease considerably due to factors such as Russia's export duties on its wood or other actions hampering imports to Finland. For example, the EU requires imported wood to be inspected for pests, and currently about one per cent of Russian wood imports to Finland are inspected in this way. If dangerous quarantine pests or pathogens were to be found in imported wood, the inspection obligation would probably be extended considerably, which would add to the costs of importing wood and thus hamper imports. In an extreme case, this could mean that all wood imports would need to be inspected. The future scenario contains an assessment based on an illustrative calculation in which import volumes are halved by 2015 in comparison with their 2004 levels (i.e. imports return to their 1996–97 level).

- As a consequence of the restricted imports, the forest industry in Finland would increase its demand for domestic wood substantially. As a proportion of the forest industry's total wood consumption, domestic wood could then account for 86% by 2015 as compared with about 77% in 2004.
- There would be increased pressure for a rise in domestic stumpage prices, although this would vary according to the type of wood. The impact on stumpage prices would depend on factors such as the extent to which imported wood could be replaced with domestic wood. Rising stumpage prices would not, however, be in the interests of forest owners either in the longer term, as this would add to the pressure on the forest industry to adjust its production in Finland. In such a case, it would be essential to employ different methods to increase the supply of domestic wood.
- As imported wood prices rise and/or imports become more difficult to obtain, Finnish corporations would become more interested in making new investments in Russia, which, indeed, is one of the goals of Russia's policy.

The change labelled '*collapse in public subsidies for the forest sector*' is an attempt to reflect a situation in which the forest sector, along with other sectors, would be affected by the Government's aim of reducing public expenditure in general to a level significantly below the current figures. Public subsidies for the forest sector could then be cut substantially, and the implications of this could include the following.

- The Government would direct its input mainly at R&D, education, training and consultancy, as well as maintaining and improving the public road network and the rail network. Research could be made more cost-effective by measures such as merging smaller research units into larger entities and by increasing the proportion of competitive funding. State subsidies would, however, continue to be directed towards supporting public goods, such as environmental services, because market-based funding would not be available for these. The cuts in financial support measures for wood production would be made on the basis of their effectiveness (new road

construction and improving young stands, for example, could therefore suffer major cuts) and by making buttrot prevention a statutory duty.

- More extensive and advanced application of electronic information and communications technology, in particular, would provide opportunities for greater efficiency, for example within forest sector organisations, in forestry activities and in the supply of non-wood forest services.
- The supply and direct marketing of forest services would be promoted in order to maintain the efficiency of wood production. The fees paid to local forest management associations would instead be on the basis of service vouchers or fund contributions, so that services could be ordered from any competent supplier. Entrepreneurship would be promoted by eliminating factors restricting competition and by emphasising entrepreneurship in education, training and research.
- Conservation needs will be defined in order to guarantee a reasonable level of biodiversity preservation, and Government actions will be restricted by this. Nature-based tourism and recreational use will be expanded primarily in non-industrial privately owned forests, and these activities will be promoted through, for example, R&D, including specification of market-based landscape trading models. Landscape management will figure more prominently in forest sector education and training, and models will be created for forest owners who have multiple objectives; the aim of the models would be to combine wood production and landscape management more effectively.

The change labelled '*unforeseen developments in climate change*' is based on the assumption that new information will prove the adverse effects of climate change to be significantly greater than expected and/or to occur sooner than expected. Changes may also occur that are interpreted as being effects of climate change even though research may not necessarily be able to verify this, and which lead to increasing concern (cf. Hurricane Katrina in the USA, 2005). As a consequence there will be a greater political will to embark on more robust measures to control the effects of climate change, such as higher taxation of fossil-based energy, tougher emissions payments and support for renewable forms of energy. In the future scenarios presented, it is climate change that could potentially have the greatest impact on the operating environment of Finland's forest sector. However, climate change correspondingly has the greatest uncertainty attached to it as to the nature and extent of the effects. A number of tentative assessments of the effects are given below.

- The demand for and production of forest-based bioenergy would increase considerably more than anticipated, due to factors such as the following: the rising price of permits to emit carbon dioxide; expansion of the emissions trading system to include the transport sector; the Government's enhanced taxation and subsidies policy for increasing the production and use of bioenergy; changes in consumption habits; and the strengthening of market-driven demand for bioenergy.
- Powerful and relatively rapid growth in forest bioenergy production would lead to considerable challenges for the ecological sustainability and biodiversity of the forests. This in turn would also lead to a major increase in R&D and education and training aimed at solving the problems.

- The relative competitiveness of wood-based products would improve significantly compared with products that are fossil-energy based. This would be especially advantageous for the wood products industry in the field of construction and also for other forms of use compared with competing materials. Wood demand would be considerably higher in 2015, as would be the price of wood and the profitability of non-industrial private forestry. The carbon capture market would evolve and create new earnings opportunities in the forest sector.
- Climate change would increase the risk of forest damage. Species that are unsuccessful in Finland's present climate could in future become well established. The duration of the growing season and the period of wet, unfrozen ground conditions in winter may be extended, periods of summer drought could become more common, average spring temperatures could rise and spells of extreme cold that limit the occurrence of pests and diseases could occur less frequently. There may also be a change in the interactive mechanisms between trees and the various forest pests and diseases. Existing forest pests and diseases could become more widespread in response to factors such as an acceleration of their life cycles. Major damage could also occur more often, which is already evident in the case of the pine sawfly.
- Major storm damage would occur more often in Finland. This could lead to serious disruptions in regional wood markets, among other things.

## Strategy of development, transformation and coordination

Based on the operating environment analysis and future scenarios presented above, it is possible to form a strategy for adapting to change and for achieving the desired future state of the forest sector. The report does not seek to recommend what form a detailed final strategy should take, but instead presents the building blocks which could be used to assemble such a final strategy and the grounds for doing so. In general terms, however, the broad strategy that emerges from the analysis presented can be given the title '*strategy of development, transformation and coordination*'. The strategy embraces the following four key goals:

1. Development of the forest sector's existing structures
2. Promotion of new wood processing products and services
3. Promotion of non-wood forest services
4. Reconciliation and coordination of items 1 to 3 above.

The respective emphasis given to each of goals 1 to 3 within the detailed strategy selected and in the related measures would be up to the political decision-makers and the corporations and other operators in the forest sector. Whether the strategy gives priority to, for example, *development* or *transformation* will depend on e.g. the extent to which there is a desire to stress 'developing existing structures' or 'active change' scenario.

The report presents general policy measures, and some more detailed measures too, for pursuing the above strategy. Here, we focus on generic policy requirements that would seem to be necessary regardless of which of the goals are given priority in the above strategy.

The challenges brought by changes in the operating environment that will have to be met through public policy measures are increasingly cross-sectoral, i.e. the responsibilities are not in line with the traditional divisions between Government ministries. Traditional forest policy centred on wood production will no longer be sufficient. Instead, forest policy will need to be linked ever more closely with business, trade, energy and environmental policies. This will highlight the importance of coordinating the policy on forest uses at an administrative level, and new modes of operation. By furthering cooperation and developing the range of policy measures it will also be possible to promote a more diverse forest sector able to generate greater prosperity and wellbeing for society as a whole.

The promotion of forest bioenergy is an good example of the need for a cross-sectoral policy. It crosses over a number of different policy sectors, and its efficient advancement requires simultaneous and coordinated measures. For example, bioenergy offers new opportunities for producing environmental, economic and security benefits for society. The production and use of bioenergy will enable carbon dioxide emissions to be reduced by replacing the use of fossil fuels. Use of bioenergy can also replace imported energy, boost self-sufficiency in energy and safeguard energy supplies 'at a reasonable cost' in any crisis situation. Bioenergy production could be based on the domestic market and could be regionally dispersed. The production of bioenergy alongside existing forest industry products will also enhance the profitability and business of the forest industry corporations, provide employment directly and indirectly, and increase incomes in regions with a predominance of forested land. However, to ensure a sustainable increase in bioenergy production it will also be necessary to manage the ecological sustainability of the forests, which is an area that would benefit from further research. Besides bioenergy, the forest sector can offer many other win-win opportunities in which many different aims in society can be combined (e.g. wider use of products from the wood products industry).

There is a fairly broad consensus that Finland's strengths in the globalisation process lie in know-how, innovation and originality, rather than in low-cost production of standard products and services. This also applies to the entire forest sector. In practice, this role can be pursued by improving the effectiveness of research, education and training, sharpening skills and recognising the need for coordination and additional resources for these. This aim should also be one of the strategic focus areas in forest policy. It is also important to ensure that this aim is not simply rhetoric but is translated into new measures and additional resources.

Safeguarding the vitality and wood production of Finland's forests will be a key challenge for society in the longer term. If additional prosperity and wellbeing are to be generated from the country's forest resources, it is important that these resources remain abundant and diverse. This will ensure that the availability of high-quality wood raw material can be secured for both the existing and future needs of the forest industry. At the same time, abundant and diverse forest resources will enable other forms of use that are important for the prosperity and wellbeing of society. Maintaining the vitality of the forests is also important in making provision for future environmental change, both foreseen and unforeseen.

## Choices

Climate change, the world's rapidly growing energy needs, interest in products based on renewable natural resources, and the importance of forests for recreation and health are all key forces driving change and will shape Finland's forest sector operating environment in the decades to come. The forest sector has excellent potential for helping to generate additional prosperity and wellbeing, both material and immaterial, and with reduced strain on the environment. Finland will increasingly shift towards a bio-based economy, which is one of the fundamental pillars of sustainable development. From this perspective, the future challenges and opportunities for the Finnish forest sector appear encouraging.

Both future scenarios presented in this report – or a combination of them – will provide opportunities for the Finnish forest sector to continue to prosper in the future. Both scenarios require many of the same measures, and particularly important among these is investment in research, education and training. These are necessary in order to understand the significance and impact of changes occurring in the operating environment and to know how to gain the greatest benefit from these changes and minimise the adverse effects. Both scenarios also require more effective coordination of the different uses of the country's forest resources. The scenarios presented also differ in important ways. The 'active change' scenario requires a considerably greater shift in attitudes and an open-minded approach from all operators in the forest sector than under the 'developing existing structures' scenario. The attitudes prevalent in society and especially the forest sector will thus be of critical importance in making choices.

The more accurately the forest sector is able to appraise its own activities, including consideration of prosperity and wellbeing in society at large, the more likely its activities will be accepted by society. Moreover, the higher the degree of acceptance, the easier it will be to promote the future of the forest sector. Adapting the often quoted inaugural speech of President Kennedy, the forest sector should not merely ask what society can do for it but also what it can do for society.

The readiness for change will also be shaped by the sector's own culture and traditions. A distinctive characteristic of a strong society, business sector, company or product (brand) is that it can withstand the transitions and discontinuities brought by change. A further distinctive feature of strong business sectors and those within them is that they welcome assessments of their business, even critical ones, and are keen to discuss them. Such discussion may even stimulate more purposeful and focused development.

The forest sector is characterized by its long-term nature. After all, a seedling planted today may not achieve the dimensions of a sawlog or be able to house a woodpecker until perhaps even a hundred years later. Forests and their importance for Finland will remain even if their significance and use vary at different times. The long-term nature of the forest sector's business highlights the need to understand the changes taking place and the necessity of having the mental readiness to react to them in time. Succeeding in this is the key question for the future of the forest sector. The choices that will need to be made will not be easy. As ancient Chinese wisdom puts it: "When the winds of change blow, some build walls, others build windmills."