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Description

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<tr><td>Abstract</td><td colspan="3">The Government Report on Forest Policy given to the Parliament in February directs the use of Finnish forests until 2050. The National Forest Strategy 2050 describes priority objectives and more detailed measures that will promote the achievement of the strategic objectives set out in the Government Report on Forest Policy. Thus the Forest Strategy highlights priority areas for developing the sector and the most urgent needs for changes on which the public sector must focus in the following years.

The vision of the Forest Strategy is "Sustainable forest management is a source of growing welfare". Based on the vision the objectives set in the Forest Policy report are: 1. Finland is a competitive environment for forest-based business, 2. Forest-based business and activities and their structures are renewed and diversified and 3. Forests are in active, economically, ecologically and socially sustainable and diverse use.

The first objectives is implemented by supporting the growth and development of the current and new enterprises in the forest sector and access to raw material supplies and by influencing the EU and international forest-related policies. Work on the second objective is done by developing a diverse knowledge base and skills according to the needs and by reinforcing the forest-related governance. The third objective is focused on the sustainable management and use of forests.

The implementation of the strategy takes place by carrying out the priority measures, which have been compiled into a strategic project portfolio aimed to achieve even better conditions for increasing the welfare to be derived from forest-based business and activities and to ensure economic, social and ecological sustainability. The objectives of the Forest Strategy are also implemented as part of the everyday development work and implementation of other strategies and programmes. The implementation of the Bioeconomy Strategy, Energy and Climate Policy Strategy and National Biodiversity Strategy, in particular, are closely linked to achieving the objectives of the Forest Strategy. The regional forest programmes drawn up during 2015 support the implementation of the Forest Strategy and the achievement of its objectives.</td></tr>
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<tr><td>Tiivistelmä</td><td colspan="3">Valtioneuvosto antoi helmikuussa 2014 eduskunnalle metsäpoliittisen selonteon, joka ohjaa metsiemme käyttöä vuoteen 2050 asti. Kansallinen metsästrategia 2025:ssa priorisoidaan tavoitteet ja yksityiskohtaisemmat toimenpiteet metsäpoliittisessa selonteossa asetettujen strategisten päämäärien saavuttamiseksi. Metsästrategiaan on siten nostettu alan kehittämisen painopistealueet sekä muutostarpeiden kärjet, joihin seuraavien vuosien aikana julkisen vallan tulee erityisesti keskittyä.

Metsästrategian visio on ”Metsien kestävä hoito ja käyttö on kasvavan hyvinvoinnin lähde”. Visioon pohjautuen on metsäpoliittisessa selonteossa asetettu strategisiksi päämääriksi: 1. Suomi on kilpailukykyinen toimintaympäristö metsiin perustuville liiketoiminnoille, 2. Metsäala ja sen rakenteet uudistuvat ja monipuolistuvat ja 3. Metsät ovat aktiivisessa, taloudellisesti, ekologisesti ja sosiaalisesti kestävässä ja monipuolisessa käytössä.

Ensimmäistä päämäärää toteutetaan tukemalla metsäalan jo olemassa olevien ja uusien yritysten kasvua ja kehittymistä, raaka-aineen saatavuutta sekä vaikuttamalla EU:n ja kansainväliseen metsäpolitiikkaan. Toisen päämäärän pyritään kehittämällä monipuolista ja tarpeita vastaavaa osaamista ja vahvistamalla hallinnon toimintaa. Kolmas päämäärä keskittyy metsien kestävään hoitoon ja käyttöön.

Strategian toimeenpano edellyttää priorisoitujen toimenpiteiden toteuttamista. Priorisoiduista toimenpiteistä on muodostettu strateginen hankesalkku, joiden toteuttamisella tavoitellaan nykyistä parempia edellytyksiä metsäalan tuottaman hyvinvoinnin kasvattamiseksi sekä taloudellisen, sosiaalisen ja ekologisen kestävyyden turvaamiseksi. Metsästrategian tavoitteita toteutetaan myös osana jokapäiväistä kehittämistyötä sekä muiden strategioiden ja ohjelmien toteuttamista. Esimerkiksi biotalous-, energia- ja ilmasto- sekä biodiversiteettistrategioiden toimeenpanot kytkeytyvät olennaisesti metsästrategian päämäärien toteutumiseen. Vuoden 2015 aikana laadittavat alueelliset metsäohjelmat osaltaan tukevat metsästrategian toimeenpanoa ja tavoitteiden toteutumista.</td></tr>
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Contents

Abstract

Forest-based business and activities in Finland will undergo important changes over the next ten years. Forest-based business and activities, forest management and use, and welfare derived from the forest will diversify, offering great opportunities for the sector. New investments will result in more pronounced integration of the wood processing industry with fields of traditional chemical and energy industries. New investments in the wood processing industry will push up the demand for wood, promote our society's transition from fossil to renewable raw materials and contribute to the growing welfare derived from the forests. At the same time, demand is expected to grow in services linked to forest-based business and activities and in the natural products sector. This trend must be accounted for in the forest policy and other policies that impact on forest-based business and activities. Forest-based business and activities are a key part of the Finnish bioeconomy that will help to generate sustainable economic growth in Finland.

In February 2014, the Government submitted to the Parliament a Government Report on Forest Policy that will direct the use of the Finnish forests until the year 2050. The National Forest Strategy 2025 describes priority objectives and more detailed measures that will promote the achievement of the strategic objectives set out in the Government Report on Forest Policy. The National Forest Strategy highlights priority areas for developing the sector and the most urgent needs for changes on which the public sector must focus in the following years. The development needs will be reassessed flexibly, and new strategic projects may be launched as required. Action must be taken to ensure that growth in forest-based business and activities and sustainable forest management will increase human welfare in the future.

National Forest Strategy preparation relied on broad-based stakeholder cooperation that was directed by the the Ministry of Agriculture and Forestry and supported by the National Forest Council. The National Forest Strategy's vision is that
SUSTAINABLE FOREST MANAGEMENT IS A SOURCE OF GROWING WELFARE

With this vision as its starting point, Government Report on Forest Policy set the following strategic objectives:

1. Finland is a competitive operating environment for forest-based business.
2. Forest-based business and activities and their structures are renewed and diversified.
3. Forests are in active, economically, ecologically and socially sustainable and diverse use.

The National Forest Strategy contains 28 objectives that have been organised into seven groups. The first digit in the numbering system indicates the strategic objective to which the group in question belongs.

1.1 Forest sector grows, enterprises and business are renewed and new and growth enterprises are developed.
1.2 Supply of raw materials allows for increased use of forests and new investments
1.3 EU and international forest policy promote sustainable use, acceptability and competitiveness of forests and wood
2.1 Know-how on forest-based business and activities is diverse and responds to changing needs
2.2 Administration is flexible, effective and customer-oriented
3.1 Forestry is active and businesslike
3.2 Forest biodiversity and ecological and social sustainability are reinforced

The prioritised measures which must be implemented in order to implement the strategy have been gathered into a strategic project portfolio. By implementing these projects, better preconditions for increasing welfare produced by forest-based business and activities and safeguarding economic, social and ecological sustainability can be achieved. Some of the National Forest Strategy objectives can also be realised as part of every-day development efforts and implementation of other strategies and programmes. For example, implementation of the bioeconomy, energy, climate and biodiversity strategies has strong links with achieving the goals of the National Forest Strategy. The regional forest programmes to be drawn up in 2015 will also support National Forest Strategy implementation and the achievement of its objectives.

1 Forests offer solutions for human and societal needs

The current long-term changes in the global economy, population growth, the climate, ecosystems, technologies and social structures will bring about many types of transformations in global and national communities. The Finnish forest sector is also facing significant changes within the next ten years. This development is reflected in the forest policy and other policies that have a bearing on forest-based business and activities. Forest-based business and activities, forest management and use, and welfare derived from the forest will diversify, offering great opportunities for the sector. Finnish people will benefit from more active and sustainable forest management[1], for example, in the form of new jobs and earnings, revenue to meet central and local government expenditure, better opportunities for recreation and environmental benefits produced by the forest, including improved biodiversity of forest nature.

In this National Forest Strategy, forest-based business and activities are understood in a broad sense. In addition to forestry and wood-processing industries (forest, energy and chemical industry), they also comprise the production, processing and services as well as public goods based on both tangible and intangible products. Forest-based business and activities are an essential part of the Finnish bioeconomy.

Today, the exports of wood-based products account for some 20% of the total value of Finnish exports of goods. The significance to the national economy of forest bioeconomy production is stressed as the factors of production are mainly domestic. While the expansion and internationalisation of Finland's forest industry have enabled growth in this sector, it has also become increasingly dependent on global trends and markets. Factors that will be highlighted in the future include sustainability of operations, material and energy efficiency, ICT, bioenergy, environmental and nanotechnology, and the development and growth of green chemistry. For example, the advancement of ICT has changed and will continue to change consumer habits and thus reduce the demand for printing paper grades. On the other hand, more than one out of three of chemical industry companies operating in Finland are already using bio-based raw materials, and the use of renewable raw materials, including wood, is increasing. The use of wood for energy has expanded strongly, and wood currently is our most important energy source. This trend is also underpinned by climate change and growing environmental awareness.

Services based on forests also have significant growth potential. The market for forestry services is evolving, nature tourism and the use of forest for recreational and well-being purposes is growing in importance, and new services are being developed for these fields. Ecosystem services – benefits to humans derived from nature – are a significant source of welfare for Finnish people. Over the long term, well-functioning ecosystems will play a key role in safeguarding the availability of ecosystem services for future generations. The forests also serve as a source of mental well-being and have cultural significance for Finnish people. At the local level, forests also produce welfare through their impacts on regional economies. The Regional Forest Programmes prepared on the basis of the National Forest Strategy may emphasise the strengths of various regions to promote diversifying, multi-sectoral and sustainable development of forest-based business and activities.

In February 2014, the Government submitted to the Parliament a Government Report on Forest Policy that will direct the use of the Finnish forests until the year 2050. The Parliament adopted a position on the Forest Policy Report based on the Agriculture and Forest Committee's report in May 2014. The Parliament's position stresses Finland's natural capabilities and expertise as a leading forestry country in the world, increasing the use of wood as a raw material, facilitating generation changes to promote active entrepreneurship based on forest use, and creating preconditions for new investments. The position also highlights acting with initiative and systematically exerting influence in the drafting of EU and international forest and environmental policies.

The National Forest Strategy 2025 (NFS 2025) describes priority objectives and more detailed measures that will promote the achievement of the strategic objectives set out in the Forest Policy Report. These measures will be needed to ensure that growth in forest-based business and activities and sustainable management of forests will increase human welfare in the future. Making choices is part of the strategy process. The National Forest Strategy highlights priority areas for developing the sector and the most urgent needs for changes on which the public sector must focus in the following years. The development needs will be reassessed flexibly, and new strategic projects may be launched as required.

The National Forest Strategy 2025 was adopted as a Government Resolution on February 12th 2015. In the future, the National Forest Strategy will serve as Finland's National Forest Programme.

The vision of the National Forest Strategy, which sets the aim to 2050, comes directly from the Government Report on Forest Policy. This vision is:

1 Sustainable forest management denotes the management and use of forests and forest lands in a way that pre-serves their diversity, productivity, regenerative capacity and vitality as well as the opportunity to carry out now and in the future significant ecological, economic and social activities on local, national and global levels in a way that does not harm other ecosystems. The term sustainable forest management and use also includes forest con-servation.

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The vision highlights the versatile welfare obtained from the forests and the fact that the forests offer solutions for human and societal needs. Through forest policy we can create a setting for a growing forest-based bioeconomy and more diverse welfare.

In order to realise the vision and increase welfare derived from the forests, we must successfully implement key measures aiming to develop the sector. On the basis of the vision, the Forest Policy Report sets the following strategic objectives (Figure 1):

1. Finland is a competitive operating environment for forest-based business.
1. Forest-based business and activities and their structures are renewed and diversified.
1. Forests are in active, economically, ecologically and socially sustainable and diverse use.

The long-term strategic objectives of the Government Report on Forest Policy have been incorporated in the National Forest Strategy. The strategic objectives of the report combine to form a whole where the growing welfare set as the target of the vision is viewed from three mutually complementary perspectives. Diverse growth in welfare will come from achieving these objectives. Finland is a society which produces forest-based high value-added products and services for exports and domestic consumption and which also sees to the sustainability aspects in forestry and in the whole value chain of forest-based bioeconomy in a balanced way. The competitiveness of forest-based business and activities in Finland rests upon successful and anticipatory reconciliation of all these issues in a changing operating environment.

Figure 1. In the triangle formed by the vision and the strategic goals, the growing welfare that the vision aspires for is at the centre, and the corners represent the interlinked strategic objectives.

As regards forests, the National Forest Strategy supports the implementation of the Bioeconomy Strategy. Policies on forest issues are also laid down in other strategies and programmes (Figure 2 and Chapter 4). These include the Strategic Programme for the Forest Sector (MSO), the Forest Biodiversity Programme for Southern Finland (METSO), the Energy and Climate Policy Strategy, the National Biodiversity Strategy, and rural and regional policy strategies and programmes. The Bioenergy Strategy serves as an umbrella for the other actions. Forest policy is also influenced by many international and EU policies. The Report on Forest Policy and the National Forest Strategy bring together and reconcile actions that concern forests.

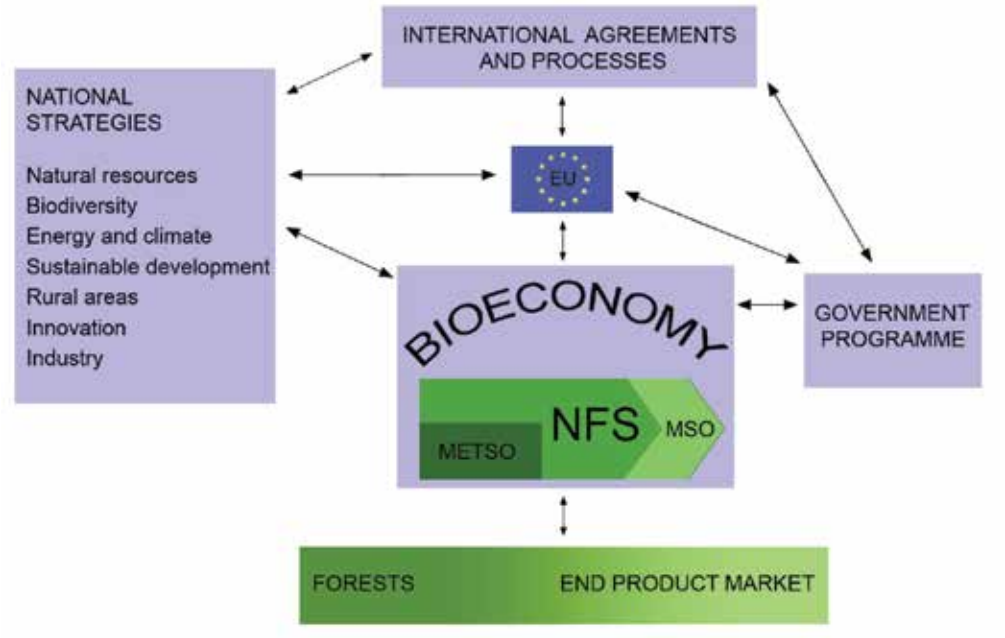

Figure 2. Links between the National Forest Programme and other policies NFS = the National Forest Strategy, MSO = the Strategic Programme for the Forest Sector.

2 A changing operating environment

The Government Report on Forest Policy 2050 contains an analysis of the changing operating environment of the forest-based business and industries. This document provides a concise description of key factors influencing the operating environment and changes that have taken place since the publication of the Report.

2.1 Populations grow, standards of living rise and the demand for natural resources increases globally

The world's population is set to reach over 9 billion by the year 2050, at which point approximately 70% of the population will live in cities. Urbanisation together with technological development, rise in educational level and increase in the labour force as well as growing trade in services and R&D activities will promote the growth of the global economy. The OECD estimates that while the global economy will grow some 3% annually over the next 50 years, this growth is likely to slow down after 2030. The growth of the global economy, on the other hand, will bring higher standards of living and increase general welfare and consumption in most parts of the world.

The developing countries, in particular, will be drivers of the global economic growth. Economic growth will increase the consumption of forest products, and the strongest growth will be seen in Asia and Africa. Demand for higher value added products and forest-related non-market benefits will increase.

The demand for energy will increase. The share of renewable energy is expected to reach some 30% by 2035. While the demand for natural resources keeps growing, the resources will be used more effectively, and technological development will also enable the utilisation of new natural resources. The need for agricultural land will increase throughout the world until 2030 due to the increasing demand for food and cultivated biofuels. These changes are expected to result in a 13% reduction in the global volume of forests by 2050.

Besides population growth, other key problems affecting development will be climate change, the availability of clean water, changes in land use and loss of biodiversity. As the bearing capacity of the globe is limited, a transition to sustainable consumption and production will be needed. It is likely, however, that new resource-efficient technologies will allow us to change these trends. By adjusting to climate change, we can reduce our society's vulnerability to its effects. Attempts to combat biodiversity loss have included conservation and nature management.

2.2 Advancing globalisation, developing information technology

As a result of globalisation, various parts of biomass value chains, as well as chains connected with other raw materials, will be more strongly distributed between different parts of the world. The focus in paper and pulp production, for instance, has switched to countries with lower production costs, although over time the production costs in the developing and the developed nations will come closer to each other. The location of industries is influenced not only by production costs but also by logistic costs and the availability of raw materials. New technologies, robotics and new innovations are creating competitiveness in developed countries, and the trend may also be turned. On the other hand, the Internet and digitalisation of information will continue to change competition and the operation of all companies. As a result of the advancing information technology, printing and writing paper will increasingly be replaced by electronic formats in communication and advertising, also in developing countries. However, information technology will also enable the marketing of new products and applications in forest-based business and activities.

The prospects for certain traditional paper and paperboard products are much brighter than for graphic printing papers. The demand for paperboard for consumer packaging is expected to grow, as globally speaking, packaging is increasing by about 3% annually. Paperboard consumption has gone up as online shopping increases the need to package products. The need for smart packaging will grow globally, for example, as we wish to extend the shelf life of foods, and smart pharmaceutical packages are needed for the ageing population. The household, hygiene and tissue paper markets are also growing. The global demand for pulp will grow, and wood fibres will increasingly replace fibres manufactured from fossil natural resources.

2.3 More diverse and complex international and national forest-related policies

The growing volume of international environmental legislation and conventions is a key factor impacting on forest-based business and activities. This will be highlighted in the future, as the EU lacks a common forest policy based on legislation. Among other things, EU policies on agriculture, energy and the climate, natural resources and trade will have a strong impact on the forest sector. The European policy accentuates such aspects as material efficiency and a low-carbon economy. The EU forest strategy aims for better coordination of forest-related policies in EU decision-making. The strategy's objectives include promoting and ensuring sustainable forest management, balancing various forest uses, and providing a basis for forestry and the whole forest-based value chain to be competitive and viable contributors to the bio-based economy.

The complexity of policies relevant to forests and forest-based business and activities affects their predictability. Keeping up with the policy and finding opportunities for exerting influence on it will be increasingly important and challenging, as drivers of change and policies outside the sector have a strong impact on it. The complexity of policy also results from the diversification of the forest-based business and activities themselves and operations that cross conventional sectoral boundaries. For the actors, predictability of policies is vital in terms of societal development, including promoting innovations and expensive investments with long-term effects.

2.4 General economic development in Finland

In comparisons drawn up by the World Economic Forum (WEF), Finland has in several years ranked among the three most competitive countries. This means that conditions for the development of forest-based business and activities in Finland are very favourable. Above all, Finland's excellent rankings in these comparisons are based on effective economic and social institutions, innovation, and the citizens' good status of health and high levels of competence. Moreover, in a recent comparison by the World Bank, Finland was ranked eleventh among the 185 countries assessed with regard to preconditions for entrepreneurship.

The current global economic situation is also reflected in forest-based business and activities in Finland. The most fundamental transition is taking place in the structure of traditional industries, as production in the paper industry has declined. The structure of Finland's industries should thus be diversified. According to forecasts, Finland's economy will suffer over the short term from an extended slow growth phase and the unfavourable impacts of changes in the production structure. Moreover, ageing of the population is weakening the prerequisites of economic growth and increasing public expenditure. As a consequence of weak exports, Finland's trade balance has shown a deficit for several years. The current trend in the trade balance cannot be explained by economic cycles alone; a structural change in Finnish industries has also contributed to the decline. In general, we can say that Finland needs universal and extensive structural policy solutions that extend to different sectors in order to put its economy back on track for growth.

The development of new kinds of industrial production and service business operations requires a supporting operating environment where various kinds of experiments and failures are also permitted. It has been estimated that the share of services in Finland's gross domestic product will continue to grow, whereas the shares of processing industry and primary production will decline. The share of services in total production and total number of the employed currently is approx. 70%. Along with higher levels of affluence, demand for higher value added products and services increases. Increasing environmental awareness feeds the demand for sustainable production.

Strict budget discipline will be needed to balance the public economy. More critical examination of financial inputs from the central government to developing operations will be needed. Due to public economy cutbacks, funds must now be allocated in a more goal-oriented way, and new funding models based on public-private partnerships must be sought. Preconditions for balancing the public economy also include better efficiency and rationalisation of functions.

2.5 Finnish forest resources and forestry

Finnish forests are now growing more than ever before since Finland became independent in 1917. Factors contributing to the growth of the forests include the higher growing stock volumes, the increasing share of young forests, and inputs in forest management and forest improvement. The climate change is likely to accelerate growth in Finnish forests even more, particularly in the north and in peatland forests. According to the 11th National Forest Inventory, the annual increment was 104.5 million cubic metres, of which increment in commercial forests accounted for some 99 million cubic metres (Figure 3). The growth in stock volume and increment that began in the 1970s continues, further increasing the harvesting potential.

The harvesting volumes have been significantly lower than the sustainable harvesting potential in recent years. The greatest sustainable harvesting potential of roundwood in 2010–2019 has been estimated at some 73 million cubic metres a year. In addition, the corresponding estimate of total energy wood removal is 21 million cubic metres a year, of which 7.3 cubic metres is stemwood. The estimated total removal of energy wood is strongly linked to the roundwood harvesting volumes, as some 66% of it consists of wastewood and stumps left over after roundwood felling. The estimated value of total sustainable removal of roundwood will grow over the next few decades. It is estimated that in 2025, the maximum sustainable harvesting potential will be some 78 million cubic metres a year for roundwood, 10 million cubic metres a year for energy stemwood and some 12 million cubic metres a year for stumps and branches. If such goals as the emission targets under the second commitment period of the Kyoto Protocol are accounted for in the calculations, the sustainable harvesting potential will be smaller than this (see Chapter 3.1.2). We must also remember that in practice, the supply of wood is smaller than the sustainable harvesting potential.

It is expected that climate change will increase the increment of roundwood in Finnish forests by some 10% by year 2020 and 29% by 2050 in mineral soils. As the estimates are uncertain, this increment was not included in the aforementioned calculations. A precondition for achieving this increment is good forest management. The increment will increase the potential for harvesting and other forest use in the future. However, the risks to the health of forests posed by climate change must also be controlled. Forest damages should be actively monitored, and early response is vital.

Photo: Antti Otsamo

The significance of private forests in the development of forest-based business and activities is great, as approximately 80% of domestic roundwood used by the industry comes from private forests. The annual stumpage earnings amount to some EUR 1.5 billion. It is expected that in the future, the most likely forest owners will be city-dwellers, more highly educated and also economically less dependent on forest income than before. Despite this change, forests will be managed and used actively if the prerequisites for profitable forestry are preserved and the citizens' keen interest in other forest uses can be maintained. A precondition for growth in forest-based business and activities is active and business-like forest ownership and, for example, improments in current ownership and holding structures.

Forest owners must not only capitalise on the harvesting potential but also actively manage their seedling stands and young stands to also safeguard good growth of forests over the long term. The neglect to tend young stands has increased in recent years, however. There is a total of nearly 1.6 million hectares of seedling stands or young stands where stand management or the first thinning are late in terms of optimal forest management. Excessive density of young forests slows down the basal area increment of roundwood, and management backlogs for tending will adversely affect the future harvesting potential. The land areas on which early management of seedling stands and young stands is carried out should be doubled from today's figures.

In addition to active forest management, the significance of tree breeding is growing, as depending on the tree species and the degree of genetic improvement of the seeds, using genetically improved forest reproductive material adapted to different growing and climatic conditions may improve the annual stemwood increment by 15–30% without compromising on quality. In addition, improving the quality properties of trees and their resistance to disease and pests are important goals in tree breeding when striving to meet bioeconomy needs. Biotechnology offers promising methods for speeding up and accurately targeting the genetic improvement of trees.

Finnish forests have highly significant climate impacts. The carbon sink, or the volume of carbon dioxide absorbed from the atmosphere and sequestered in growing forests, has varied between 22–50 million tons in 1990–2012 (million tons of CO2 equivalent). This equals 30–60% of Finland's total emissions annually. The carbon sequestration ability of forests can be maintained by means of active forest management, while fossil fuels and other non-renewable raw materials are being replaced with renewable ones. The most important factors for carbon sink trends are the volume and structure of timber harvesting. Finland has given an international commitment to maintain a carbon sink amounting to 17–18 million tons of carbon dioxide equivalent a year until 2020. Carbon sinks and wood products will also play an important part in the climate policy in the future, which must be accounted for when setting targets for harvesting volumes and bioenergy use.

The carbon stores of Finnish forests are put at approximately 1,300 million tons in heath soils and some 5,500 million tons on peatland. Some 700 million tons of carbon are sequestered in tree biomass. The carbon stores of trees build up when the annual increment exceeds the annual drain. The extent of the carbon stores in the soil vary depending on forest litter production, weather conditions and changes in harvesting volumes. The carbon stores of the Finnish forest flora and soils have built up; in other words, the forests have served as a carbon sink, even if some of the increment has been used for the manufacturing of wood products and bioenergy.

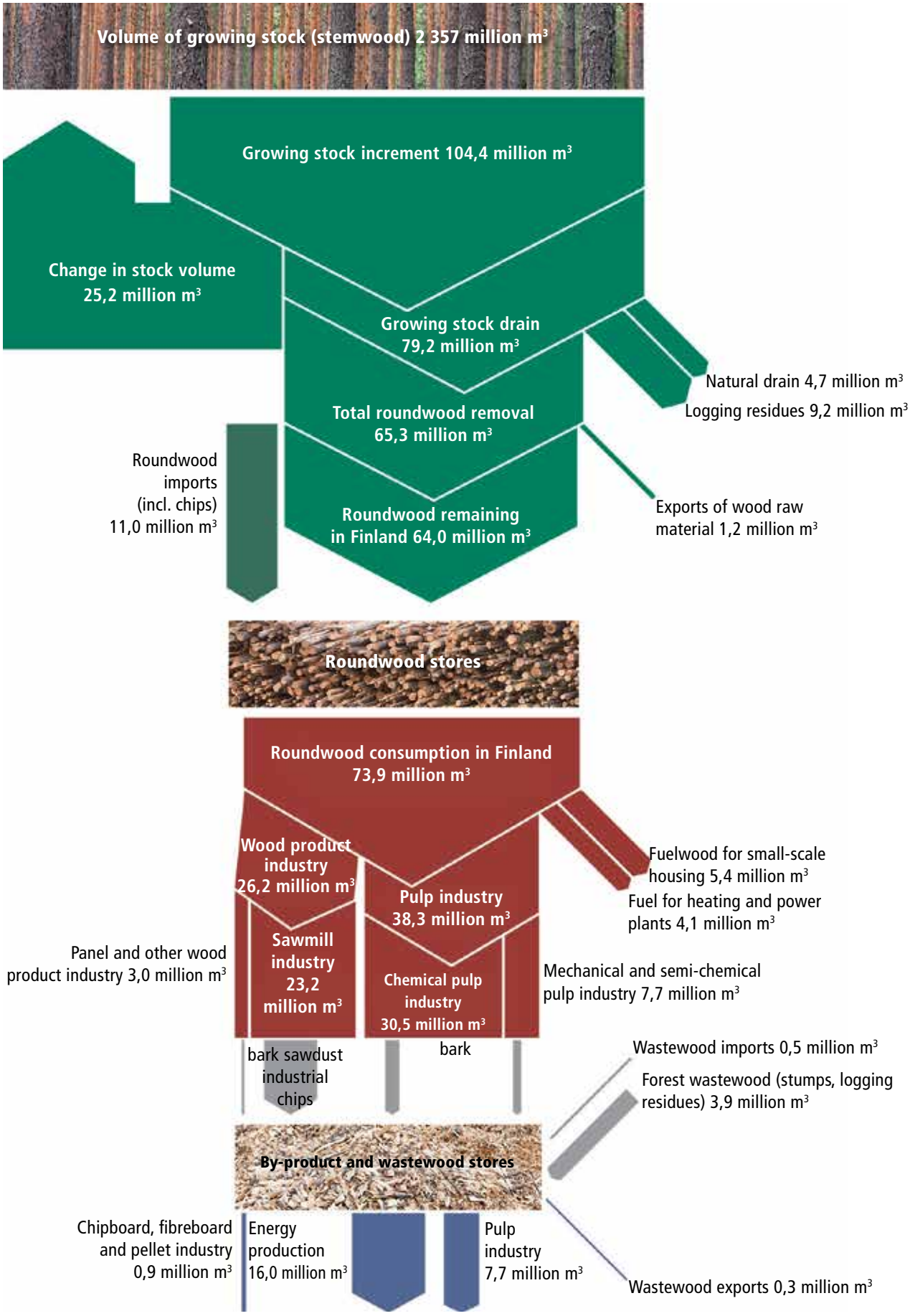

Figure 3. Wood flows in Finland in 2013. Source: Finnish Statistical Yearbook of Forestry 2014

A significant share of the living species in Finland are directly or indirectly dependent on the forests. Of the 45,000 species known in Finland, almost one half live in forests on mineral soils. Mineral soil forests are the primary habitat for a total of 814 threatened species, and 36,2% of all threatened species live in these forests. On the other hand, an assessment of threatened species concluded that 9% of all forest species assessed were threatened. A total of 104 threatened species are living in mires, including open bogs (4.6% of all endangered species), and the primary habitat for some 25% of these is pine mires or wooded mires.

Protected forests or forests in restricted forestry use account for 13% of the surface area of Finland[2]. In addition to conservation areas, this figure includes habitats of special importance referred to in the Forest Act. Strictly protected forests account for nine per cent, which is a large share in international terms. Considering the needs for conservation, however, these areas are unevenly distributed in various parts of the country; the share of strictly protected forests is 2.3% of the land area in Southern Finland and 15.8% in Northern Finland.

Photo: UPM Photo archive

2.6 Wood-processing industry in Finland

As the bioeconomy develops, considerable additional investments in forest-based business and activities and diversification of forest use can be expected. For example, new investments in pulp, bioenergy and liquid biofuel production will contribute to increasing wood use. There is a stronger interest in investments in the industry using wood, while in many other sectors, willingness to invest remains weak. Good supply of wood is a key precondition for new investments going ahead.

Several investment projects focusing on the wood processing industry are being planned in Finland. If the go ahead, they would mean an increase of some 6,5 million cubic metres in net wood consumption by 2020. The most significant individual investment project would be a 1.3. million ton pulp plant and biorefinery planned in Äänekoski, which alone would increase the demand for pulpwood by some four million cubic metres. Investments in development and changes in lines of production at existing plants will also increase the demand for wood. These projects would mainly rely on pulpwood from conifers. In addition, the demand for softwood logs in particular can be expected to grow both directly and indirectly as a result of these projects. Other new products may also increase the value of production, even over a short term, and improve the competitiveness of conventional products, for example, by utilising side streams, even if they do not necessarily affect the demand for wood directly. As a whole, it is expected that the demand for industrial roundwood will go up by over nine million cubic metres in Finland by 2020. In addition to the domestic wood supply, imported wood will also be an important raw material source in the future.
New investments will result in more pronounced integration of the wood processing industry with fields of traditional chemical and energy industries. Liquid biofuels are a good example of new products in forest-based business and activities in which integration of conventional industries can be seen. Material efficiency and developing new high value added products are at the centre of new investments. A precondition for diverse further processing of other biomass resources of the growing stock and forests is cooperation between several sectors. This is about a change in mentality, and it requires the commitment of a number of actors and sectors to the development efforts.

Wood fuels have overtaken oil products as the most important energy source in Finland. They account for some 25% percent of total energy consumption. In 2013, 38 TWh of sludge from wood processing industries and 54 TWh of solid wood fuels were used. While the share of forest chips in solid fuels was less than one half, it has shown a steady increase since the early 2000s. The trend in the use of forest chips has been in line with the obligation to increase renewable energy use set for Finland by the EU, and the use of chips for energy production has indeed increased ten-fold in the 2000s. As the target for forest chip use by 2020 has been set 25 TWh, equalling some 13 million solid cubic metres (m3) of forest chips a year. In 2013, a total of 8.7 million m3 of forest chips were used (17.4 TWh), of which 8.0 million m3 in heating and power plants (approx. 16 TWh).

The increased use of forest chips has required major investments. In addition to the investments already made, others amounting to some EUR 2.2 billion are being planned in six cogeneration plants and dozens of heating plants by 2020. The wood consumption of these plants is set to be 5–6 million m3. Households also use a total of 6.7 million cubic metres of roundwood and wastewood as well as forest chips.

2 Forest refers to forest land and poorly productive forest land.

2.7 Services linked to forest-based business and activities and the natural products sector

The demand for diverse services linked with forest-based business and activities is expected to grow. These services can be divided into services relating to wood processing products, those relating to forestry, and other services relating to forests. Services relating to wood processing products, such as management, programming, planning, research, product development, technology, marketing, sales, consulting and training functions are, alongside production, an important part of industrial operations and their significance may grow in the forest-based business and activities in Finland. Digitalisation is also likely to emphasise the role of services in this sector.

Services relating to forestry include various forest services targeted to forest owners, which are linked with the planning of forest management or actual contracting services, including harvesting operations. Added to these are various advisory services and, for instance, inventory, regional planning, administration, research and training services for forestry. Changes in the ownership structure will further increase the need for electronic services and the development of a service market for forestry. The greatest growth potential for entrepreneurship lies in planning, advisory and forest management services. Finnish expertise is also valued internationally, which means that consultancy in this field has extended into international markets.

Of the services linked with forests, the most significant ones are tourism and recreational services. Tourism directed to Northern Europe is expected to increase at an annual average rate of 2.2% in 2010–2020 and 1.4% in 2020–2030. These figures include all types of tourism, but it is anticipated that ecotourism will grow much faster than tourism on average. Finnish nature is a competitive advantage in the European tourism market, and with growing environmental awareness, it will become even more attractive. Wildlife tourism is another rising trend. Tourism may also be associated with health and well-being services relying on nature. At the moment, new markets can be developed for non-market ecosystem services, such as services connected with the water resources of forests, which may yield financial benefits to forest owners as well.

Utilisation of raw materials from nature offers significant opportunities to generate new, successful business in various sectors, not only in primary production but also in the food, biotechnology, cosmetics and pharmaceutical and herbal medicine industry. The value added produced by game management and reindeer husbandry also have growing potential. The combination of natural products with various well-being services and tourism is also a significant opportunity. In the development of new innovative products and services that are based on forests, cooperation across the sectoral interfaces will be needed, as well as networking amongst the various business areas in the field. The total value of traditional natural products – berries, mushrooms and game – also amounts to hundreds of millions of euros annually. They are an important by-product of the forests, both economically and socially.

2.8 Employment and need for education and training

The renewal of forest-based business and activities will further diversify the competence needs of employees and entrepreneurs in the sector. In the future, the sector will thus employ increasing numbers of experts from outside the sphere of conventional forest-based business and activities. While traditional forest industry and forestry employed 65,000 people in 2013, forestry currently already creates around four times as many jobs in other sectors indirectly. The Bioeconomy Strategy sets the aim at creating 100,000 new jobs in Finland in the evolving bioeconomy. Digitalisation, robotisation, cleantech and business skills will also be relevant to the future competence needs in forest-based business and activities. Policies on developing education and research conducted at universities within the administrative branch of the Ministry of Education and Culture are contained in the Education and Research Development Plan. The following plan will be completed in 2015.

It is expected that in the future, new jobs based on the manufacture and development of new biomass-based products will be created, for example, in the fields of bioenergy and transport biofuels, chemicals based on wood biomass, and new materials. The export market plays an important role in job creation. While services based on forests are expected to create more jobs in the future, some of the new jobs will replace old ones.

The productivity of forest management is expected to increase with the mechanisation of forest management tasks. Regardless of this, the demand for labour in forestry has been estimated to increase due to increased wood use, large-scale retirements in the sector and growing demand for forest services.
The needs for vocational education and training in forest-based business and activities will increase, especially in timber harvesting and logistics. In particular, the availability of forest machine operators and timber truck drivers must be secured. The labour needs of further processing of biomass must also be provided for, and new competence needs must be responded to. Research-based higher education in the forestry and bioeconomy sectors is vital for forest-based business and activities and its renewal. In addition to professional competence based on scientific research, education should also provide a good starting point for enterprising and the development of new products and services. Practical applications of research are in a key role.

2.9 Values and attitudes

In people's relationship with nature, appreciation of the environment and its conservation and the values inherent in forests beyond wood production are gaining ground. On the other hand, the growing environmental awareness supports a demand for products sustainably manufactured from renewable raw materials. It has been observed that ecosystem services produced by forests other than wood production, such as recreational use and cultural values, are being emphasised in the trends that influence the operating environment of forest-based business and activities in Finland. In the future, reconciling the various uses of forests will be more important than ever.

The broad ownership base of Finnish forests promotes the acceptability of forest management and use. On the other hand, urbanisation, demographic change and immigration are changing the citizens' relationship with nature and the forest. By encouraging the citizens' positive and versatile relationship with forests we can ensure the acceptability of sustainable forest management and use.

3 Strategic objectives, targets and indicators

In keeping with the policy laid down by the government in its Report on Forest Policy, the National Forest Strategy contains measures that will promote optimal growth in welfare and be within the control of the public sector. The measures seek to create a competitive setting for renewing forest-based business and safeguarding biodiversity and ecosystem services. The project portfolio put together to facilitate National Forest Strategy implementation may also include private sector measures that have links with forest policy development measures.

The goals and packages of measures that will implement the strategic objectives have been examined from the perspective of impact, funding, processes and structures, and mental resources. Impact means achieving benefits for society. If we focus on the customer orientation of official activities, for example, we can achieve more desirable impacts with the same resource inputs. The measures will be carried out within the framework of the central government's financial plan and approved budgets, and it will thus be necessary to target the available funding at the most vital measures that promote the development of forest-based business and activities. For example, R&D carried out on public funding can be directed at developing forest-based bioeconomy business in order to respond to changes in the operating environment. Impact can also be enhanced by improving processes and structures. Data sets in official use should also be utilised extensively to promote business and industries.

Target achievement will be measured by indicators, which mainly describe impact. The indicators will thus describe development in forest-based business and activities in more general terms than merely as achievements that can be reached by strategy measures. One indicator in this strategy may describe the achievement of several objectives. In addition to using indicators, qualitative assessments of target achievement will be carried out. An example of these qualitative assessments is examining whether or not education and training meet the competence needs of forest-based business and activities.

3.1 Finland is a competitive operating environment for forest-based business

The role of the public sector is to create a competitive operating environment for forest-based business. Public policies will promote innovations related to forests, forest ownership and the use of wood raw material, entrepreneurship, new investments, growth of business and the creation of new jobs. In the future,

resource-efficient and diverse operation will be highlighted in the Finnish wood processing industry.

3.1.1 Forest sector grows, enterprises and business are renewed and new and growth enterprises are developed

New business opportunities are based on market demand, consumer values and sustainable practices. In the future, successful large companies will provide a platform for a growing number of SMEs in forest-based business and activities. Growth-oriented and competence-driven SMEs will thus have excellent opportunities for developing bioeconomy business. Large actors together with SMEs will form new industrial ecosystems where wood and production side streams will be processed into end products for various uses and where the value added and resource efficiency of production will increase. The significance of production waste and side streams as raw materials will increase, and they will also become more important as a factor of competition. Closed cycle industries will also improve the resource efficiency of forest-based business and activities.

To fully exploit bioeconomy potential, political decisions must support the creation of new enterprises and innovations, and the legislation or its interpretations must not create unnecessary barriers to the sustainable exploitation of forests and wood. Unnecessary bottlenecks caused by current provisions that block bioeconomy development should be addressed in various branches of administration. The policies should also have a long time span and be predictable while providing a proper setting for bioeconomy and ensuring its sustainability and acceptability.

Know-how in forest-based business and activities, availability of wood and competitive factors of production, well-functioning infrastructures, advanced technologies and a high degree of sustainability are competition factors that will promote the growth and renewal of the sector. While conventional forest industry products will remain very important, new wood-based products will also be developed and manufactured, including biofuels, other biochemicals and

Indicator	Initial level in 2013	Target level in 2025
Trends in value added of forest-based business and activities by sector • Forest industry • Energy industry • Chemical industry • Forestry • Natural products • Nature tourism • Forest services and other forest-based business	 • EUR 3.9 billion (Natural Resources Institute Finland, preliminary data) • data not available • EUR 0.4 billion (total for bioeconomy, 2011) • EUR 2.9 billion (Natural Resources Institute Finland, preliminary data) • data not available • EUR 1.2 billion (2011) • data not available	Growing
Trends in turnover of forest-based business and activities by sector • Forest industry • Energy industry • Chemical industry • Forestry • Natural products • Nature tourism • Forest services and other forest-based business	 • EUR 25.7 billion (Natural Resources Institute Finland, preliminary data) • data not available • EUR 1.6 billion (total for bioeconomy, 2011) • EUR 4.22 billion (Natural Resources Institute Finland, preliminary data) • data not available • EUR 2.7 billion (2011) • data not available	Growing
Wood raw material input/value added of industry using wood	• Total wood use 45 million tons (Statistics Finland, 2012)/ value added of forest industry EUR 3,863 million (Natural Resources Institute Finland) + energy industry EUR x and chemical industry EUR 434 million	Declining
Share of wood-based energy in total consumption	• 25% (Natural Resources Institute Finland, preliminary data)	In keeping with energy and climate targets
Energy use of solid fuels, of which forest chips	• Solid wood fuels 19.4 million m^3 (38.8 TWh). • Forest chips 8.7 million m3 (17.4 TWh) (Natural Resources Institute Finland)[3]	• Target level for forest chips 15 million m^3 in 2025. If necessary, more accurate figures will be provided in connection with updates of the Energy and Climate Strategy.

[3] Figures include forest chips used in small-scale housing 0.7 million m^3.

biomaterials, and wood-based energy will increasingly be utilised in electricity and heat generation.

Product development and commercialisation of new products must be accelerated. New products will also increase the value added of forest-based business and activities. Exploitation of the raw material reserves yielded by the forests must increasingly be based on solutions that emphasise material and resource efficiency. Wood construction offers expanding possibilities, for example, in housing construction, and new techniques and materials mean significant export potential. Wood construction and wood products also represent sustainable uses of natural resources and long-term carbon sequestration. Preconditions for fully exploiting the currently underused potential of various natural products include innovations, internationalisation, more advanced technologies and development of entrepreneurship in the natural products sector.

Finland has commitments under EU energy and climate targets, the UN Climate Convention and the Kyoto Protocol alike, which oblige us to reduce our greenhouse gas emissions. One way of achieving this will be increasing the share of renewable energy, and consequently, we must promote the use of wood-based energy in a goal-oriented manner by means of long-term and predictable energy policy. By creating preconditions for wood processing industry investments, we also encourage wood-based energy production, as renewable energy is typically produced as part of the manufacturing process, and using more wood will also increase the supply of forest chips. Additionally, Finland has great potential for resource-efficient, decentralised energy production. We must safeguard the preconditions for increased production of wood-based energy, as it is the most cost-effective form of renewable energy.

In addition to climate benefits, the greatest advantage offered by wood-based energy production is that it is domestic. Wood energy and other domestic energy sources create jobs while also improving the security of supply in energy production and Finland's current account balance. Domestic energy production is not affected by external market disruptions, which improves stability and predictability in the operating environment.

Services in the sector of forest-based business and activities can be divided into services relating to wood processing products, services relating to forestry, and other services relating to forests. The market for wood processing products will expand, and instead of conventional production, they will increasingly be about integrated service solutions. Forest owners with more pluralist views will need more individualised contracting services in wood production and in nature and landscape management. The most significant field of forest-related services is nature tourism. Further development of means for reconciling nature tourism and other modes of forest use play a key role. Nature tourism can be developed relying on the network of conservation areas, but state-owned multiple-use forests also have potential for tourism. Local features,

Photo: Photo archive of Ministry of Agriculture and Forestry

including nature's resources, social capital, culture and heritage create attractive combinations and offer growth opportunities for tourism and well-being services, small-scale carpentry and energy production. The advancement of digitalisation will also enable the production of new types of goods and services and their integration. These industries have significant growth potential, which must also be recognized in public decision-making.

Objectives:

- Political decisions and new legislation improve the conditions for renewal and growth for enterprises and business in the forest sector.
- Value added grows and resources are used efficiently.
- Production of domestic wood-based energy increases.
- Growth in forest-based diverse service business and the natural product sector.

Of the aforementioned indicators, the value added and turnover of forest-based business and activities describes growth in this sector in general and the competitiveness of its operating environment. The increase in the value added and turnover also reflect increasing processing value and diversification of the sector. Use of wood for energy is part of the renewal of forest-based business and industries, and it is also described by indicators measuring the share of wood-based energy and the use of solid wood fuels for energy. The relationship between wood raw material inputs and the value added of wood processing industries describes value added and resource efficiency. Trends in the indicators for point 1.1., in particular, are greatly affected by other factors, including global economic trends and political stability, and strategy measures thus have limited possibilities of influencing their development. Regardless of this, it is important to examine the indicators to assess the impact of measures taken by various administrative branches and the need for new measures.

3.1.2 Supply of raw materials allows for increased use of forests and new investments

Abundant and healthy forest resources with high biodiversity and good accessibility will enable their increasing and diverse exploitation. Safeguarding preconditions for profitability throughout the value chain in forest-based business and activities is a key forest policy objective. It is also vital to ensure a good state of health and growth potential of forests and strive to prevent large-scale damages. Climate change will improve the conditions for wood biomass growth while exacerbating such risks as the spreading of new pests and the basidiomycete fungus into Finland. By focusing on and encouraging the timely management of forests in commercial use and efforts to catch up on management backlogs (see Chapter 3.3.1), the profitability of forestry can be improved, increment in the growing stock can be increased, and forest damages and the spread of the basidiomycete fungus can be prevented. This way, we can also safeguard the supply of wood biomass for the wood processing industry and the continued action of forests as carbon sinks while meeting the needs for forest conservation (see Chapter 3.3.2).

Indicator	Initial level in 2013	Target level in 2025
Annual increment in the growing stock in commercial forests • Stemwood	• 99 million m3 (Natural Resources Institute Finland)	• 100–110 million m^3 (in 2050, 120–130 million m^3)
Annual harvesting volumes • Total stemwood removal • Branches, stumps and root stocks[4]	• 65 million m^3 [5] • 4 million m^3	• 80 million m^3 • 8 million m^3
Public infrastructure funding • Lower-grade road network (private and local roads) • Railway network that supports timber transportation		• Transport network condition meets the needs (assessment)
Investments in wood raw material use: investments in real terms and investment rate (value of investments in proportion to value added) • Forest industry • Energy industry • Chemical industry • Service production	• EUR 760 million and 20% • data not available • data not available • data not available	• Investments exceed depreciations

[4] Branches, stumps and root stocks are included in forest chip use.

[5] In 2013, roundwood accounted for some 56 million cubic metres of the total stemwood removal. Less than 9 million cubic metres of stemwood was used for energy production, of which fuelwood for small-scale housing accounted for 5 and forest chips for 4 million cubic metres.

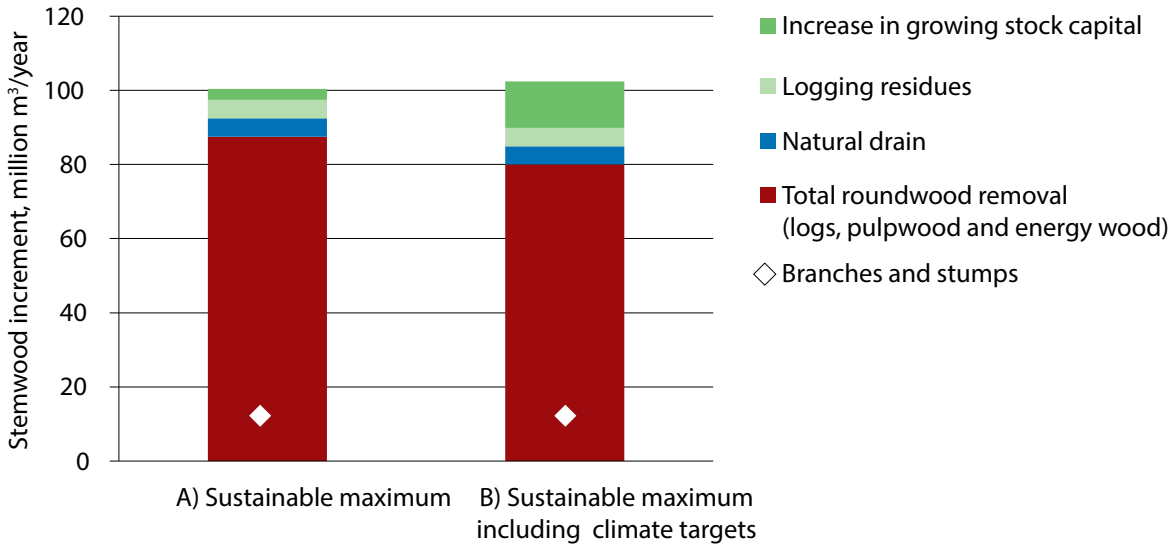

Figure 4. Estimate of growing stock increment and drain in 2020–2029. Calculation A in this Figure shows the volume of sustainable harvesting potential compared to the annual increment of stemwood calculated using the Natural Resource Institute Finland's MELA model. Standard values are used for natural drain and logging residue in the calculation[6]. Calculation B shows the sustainable total roundwood removal in which climate targets for the second commitment period of the Kyoto Protocol are taken into account. This corresponds with the targets sets in the National Forest Strategy. For the purposes of the calculations, it was presumed that management measures indicated in forest management recommendations are carried out on time. To increase the annual increment of commercial forests to 110 million m3, positive impacts caused by measures taken to increase the increment or by climate change are required, and forest damages need to stay at a low level. Major part of the carbon sink is comprised of the stands left to grow. The size of carbon sinks is influenced not only by harvesting but also natural drain. The carbon sink target decreases slightly due to a higher target for wood use (see Chapter 3.3.2).

Preconditions for competition must be provided, market functioning ensured and disruptions due to political causes prevented in the markets for wood and forest-related services. It is important to respond to development needs in various sectors of the bioeconomy. The efficiency of the current operating models can be improved, and trust can be built between the parties in timber trade. For example, new pricing models can be created for timber trade that will inspire confidence in market functioning and ensure that the price paid for timber is a better match for the processing value of the raw material or the harvesting costs. The market for forest-related services will be more customer oriented and entrepreneur driven. The efficiency of activities in the markets for wood and forest-related services will be improved, especially by drawing on geographical information related to forests.

Good condition of the road and other transport network and efficient communications will create a setting for diverse enterprising in forest-based business and activities and viability in rural areas. By developing and maintaining Finnish infrastructures, we can promote competitiveness in forest-based business and activities and contribute to ensuring the supply of raw materials for wood processing industries. An effective road network will also reduce seasonal fluctuations in wood procurement, promoting a more efficient use of the current personnel and machinery resources. This will require public funding, for example, for maintaining the road network. Public infrastructure investments must be scaled to support the anticipated growth in harvesting volumes and more efficient harvesting and logistics. This will also create preconditions for new investments and the increased use of domestic wood. The use of wood for energy will accentuate the need for harvesting and transport capacity and infrastructures. A road network that is in good condition will also promote the recreational use of forests, tourism, industries based on natural products and efficient fighting of forest fires. Effective and well-functioning communications are a basic requirement for all operations and also promote service development.

Objectives:

- Forest resources are abundant and healthy with good growth potential and respond to the growing needs of bioeconomy.
- Wood and forest service markets are balanced and competitive.
- Service capacity, efficiency and functioning of transport routes and communications are improved.

Of the indicators that describe the trends, the increment of wood biomass in commercial forests indicates the standard of forest

[6] Logging residue refers to all stemwood that is left behind after harvesting: tree tops, stems of undersized trees, rejected butts and logs, oversized stumps and unharvested logs. No annual data is available on forest wastewood produced when harvesting or the natural drain that remains unused, and the figures in the drain statistics are based on less frequently produced reports and assessments. In this Strategy, as the natural drain has been applied some 5 million m^3 and as logging residue 5–8 million m^3.

management and trends in forest resources. The increment of wood biomass can the compared to total roundwood removal, logging residues, and the natural drain. On the basis of these figures combined with the forest age category distribution and sustainable harvesting volume calculations, sustainability in wood production and future harvesting potential can be assessed (Figure 4). The harvesting volumes and commercial fellings also describe the functioning of the wood market. By examining public investments in infrastructures, we can, for example, monitor trends in the status of the road and rail network. Monitoring investments in wood raw material use, on the other hand, produces information about the competitiveness of industrial production as a whole and confidence in the availability of wood.

3.1.3 EU and international forest policy promote sustainable use, acceptability and competitiveness of forests and wood

EU and international policy decisions have a significant impact on forest management in Finland. In particular, the EU's environmental, climate and energy policies have influenced our forest policy considerably in recent years. It is vital that Finland will continue to focus strongly and in a goal-oriented manner on acting with initiative, coordination, methodical action and extensive lobbying in the drafting of both international and EU forest issues. For this, expertise, networks and adequate resources are needed. The government must allocate more resources to lobbying, especially in the EU, and engage in goal-oriented cooperation between various branches of administration and with stakeholders to lobby for Finland's positions.

Important forums for exerting influence include negotiations on the international Framework Convention on Climate Change as well as the EU's energy and climate policies extending till 2030 and, in particular, the role of sinks and forest-based energy in them. Finland wishes to ensure that any sustainable forestry criteria that may be drawn up in the EU do not unnecessarily restrict the operating conditions of the Finnish forest sector. At the same time, the sustainability of bioeconomy must be secured. The definitions of by-products, residues and wastes from forest management and wood processing in EU material efficiency and recycling policies will have a bearing on the possibilities of using and potential uses of wood-based raw materials in the future. By means of trade policy, Finland will strive to remove trade barriers and promote the compatibility and recognition of technical standards. Finland will promote comprehensive examination of forests and forestry globally in the UN's sustainable development policies, including the post-2015 Development Agenda, the International Arrangement on Forests and implementation of the Biodiversity Convention.

Finland's bilateral development cooperation in forest-based business and activities will be guided by the Development Policy Guidelines for forest sector published in 2013. This policy and its human rights based approach to development policy and cooperation stress sustainable and democratic governance of forests and just distribution of forest-based benefits, for example, by strengthening ownership and user rights. In line with the principle of participatory and job-creating green economy, more efficient and sustainable natural resources use that controls loss of forest will be promoted. In its other bilateral forest-related cooperation, Finland focuses on commercially interesting and politically significant countries, the most important ones of which have been Russia and China.

Finland strives to influence all of the aforementioned commitments, definitions, objectives and calculation rules proactively and with initiative. Correctly targeted international and EU level objectives and agreements will also support our national efforts to increase the use of wood as a raw material for various bioeconomy products, thus creating economic growth and employment.

Objectives:

- International agreements and work in various organisations promote sustainable forest management and bioeconomy.
- EU Forest Strategy and forest-related initiatives reinforce business activities in the forest-based sector and secure the conditions for and acceptability of the sustainable use of forests and wood.
- EU and international energy and climate policy reflect the real climate benefits of forests, sustainable forest management and wood-based products and wood-based fuels continue to be counted as zero-emission renewable energy sources in energy production.
- Development cooperation in forest sector contributes to poverty reduction, good governance of forests and fair and just distribution of the benefits; other bilateral forest cooperation supports commercial activity and investments as well as export of Finnish know-how on natural resources.

3.2 Forest-based business and activities and their structures are renewed and diversified

Forest policy will support the renewal of the sector and its structures. Ensuring that competence based on research and expertise is an elemental part of good governance and the drafting and implementation of forest policy and decision-making will promote the renewal of forest-based business and activities and their structures. Nimble operating methods will be used, activities will cross sectoral boundaries, and multisectoral entrepreneurship will become more widespread. The administration will become more customer oriented, and there will be more cooperation between administrative branches. Research and product development will be flexibly targeted as required. The industrial structure will diversify, and the significance of service business will increase. Competences in the sector will meet the changing needs of companies and

Photo: Photo archive of Ministry of Agriculture and Forestry

society. The significance of business skills as a driver of growth will increase.

3.2.1 Know-how on forest-based business and activities is diverse and responds to changing needs

URenewal in an ever-changing operating environment will not be possible without developing degree-awarding and continuing education, finding a new direction for research, and expanding expert capacity based on education and research. By developing research cooperation between companies in different sectors, higher education institutions and research institutes, we can improve the ability of research to promote the sector's capability for renewal. Companies and centres of expertise will play an active part in the planning and implementation of research programmes and resource allocation to improve the preconditions for research responding to the needs of business life actors. Commitment to developing education, training and research by working life actors will also be needed.

As forest-based business and activities are undergoing a dramatic renewal, publicly funded R&D should be targeted at such activities as developing new business models, promoting the commercialisation of products and services and focusing on market research. Product development on public funds must be demand driven and exploit the potential of new technologies. The societal impact of research should also be enhanced, including offering support for decision-making and adapting new knowledge to creating new and competitive products and services. In addition, research and product development should promote the productivity of forest management and build up knowledge about the ecosystem services offered by forests.

The work of the Natural Resources Institute Finland will create an excellent backdrop for expanding research relevant to forest-based business and activities. An interdisciplinary, competitive and efficient research and expert organisation can provide a faster response than the earlier structures to changes and opportunities in an operating environment that is undergoing a rapid transformation. The expanding LYNET network will contribute to strengthening research relevant to the sector as regards both ecological and economic factors in the various value chains of forest-based business and activities. In addition to the Natural Resources Institute and LYNET, research in forest-related themes carried out by the universities is also of a high standard, as was noted in the State of Scientific Research 2014 report by the Academy of Finland. This research is mainly conducted in cooperation with international scientists, and it plays a major role in the development of a forest-based bioeconomy. The significance of international research cooperation is increasing as globalisation advances. Regional development is highlighted in the R&D activities of the polytechnics.

The preconditions for research must be reinforced by developing national and international research infrastructures that will support forest research and the bioeconomy over the long term as indicated in the Roadmap for Research Infrastructures 2014–2020. To direct the activities of the Natural Resources Institute, other research institutes, higher education institutions and expert

organisations, a forest sector research strategy should be drawn up that describes priority areas of research and the roles of various organisations in promoting bioeconomy. A research strategy for forest-based business and activities would allow a targeted examination of the sector's needs and challenges, thus ensuring more efficient bioecomy research in all parts of the value chain.
In order to achieve economic growth, we also need competences of the right type and their efficient utilisation. Digitalisation and robotisation will set new types of challenges to competences. A precondition for fast and efficient practical application of R&D results is that companies have the requisite competences. Education, training and research in the sector will be targeted flexibly, with foresight and efficiently as indicated by demand and the competence requirements of companies and society. To achieve this, strategic partnerships between companies and education and training organisations will be necessary. More intensive cooperation and new operating methods will be needed to link education and the world of business. Recognizing and utilising our national special expertise, for example, in the manufacture of machinery and instruments, will be vital.

Education and training will be developed at all levels, and the qualifications and degree programmes must be flexible and customer oriented. Continuous development of the education content and efficient continuing education and retraining will be needed. Many personnel groups that are crucial for forest-based business and activities will receive their education in extensive programmes, only some of which focus directly on this sector. Particular examples of these are various fields of the wood and process industry. The use of wood and other forest-based materials should be highlighted in education programmes of various fields. Upskilling will mainly take place through non-degree awarding personnel training. The possibilities of retraining and continuing education must also be exploited in the education and training of bioeconomy experts. Competence-based qualifications provide a flexible way of complementing and updating competences. Forest-based business and activities must also be attractive to ensure the entry of adequate numbers of students and labour in the field, including experts from outside the conventional areas of expertise.

The greatest competitive advantage for the sector is motivated personnel, and occupational welfare and up-to-date personnel skills must be ensured. New experts will be needed in forest-based business and activities, especially on the interfaces of traditional sectoral boundaries, and this need must be addressed when providing education and training. Maintaining personnel skills will be highlighted in the context of the sector's renewal. Upskilling and updating of competences will mainly take place through non-degree awarding training.

Objectives:

- R&D activities by means of public funding supports, in particular, development of business in forest bioeconomy, commercialisation of products and services, demonstration projects and anticipating changes on the markets and other operating environment.
- Cooperation between education and training and working life is reinforced.
- Number of those completing education at different levels corresponds to needs relating to recruitment and know-how in the field.
- Research strategy in the forest-based business and activities steers research in line with the goals of bioeconomy.
- The competence of the staff is up-to-date and occupational welfare improves.

Of the indicators to be monitored, the amount and qualitative assessment of public R&D funding describes public inputs in the renewal of forest-based business and activities. In particular, the qualitative assessment will examine the productivity of the inputs and their targeting at the needs prioritised in the National Forest Strategy. The indicators for education, training and employment describe the attraction of forest-based business and activities, especially among young people, and success in scaling the education and training to the sector's needs. Designing a simple indicator for education and training that meets the needs of the sector is extremely challenging. For this reason, the indicator focuses on education and training in forestry. An indicator that describes the volume of production and productivity should be developed to anticipate the education and training needs of forest-based business and activities in a broad sense.

Indicator	Initial level in 2013	Target level in 2025
Amount and qualitative assessment of public R&D funding	• Public forest sector R&D funding is estimated at EUR 140 million (2012, mid-term evaluation of the National Forest Programme)	• Remaining at least at the current level • Meets the needs
Number and share of primary applicants • Separately for various levels and fields of education and training	• Summary data not available	• Share of primary applicants grows
The number of graduates, their employment rate one year after graduation and a qualitative assessment • Vocational education and training • Polytechnics • Higher education institutions	• Summary data not available	• Meets the needs

3.2.2 Administration is flexible, effective and customer-oriented

To balance the public finances, we need effective administration that is unbureaucratic and cost-effective. Cooperation will be increasingly important in the future, and we thus need to find new operating methods for lowering the fences between different sectors. As forest-based business and activities diversify, the administration must also be developed to enable the centralised handling of key horizontal processes. This will make using the services more clear-cut for the customers, the forest-owners and actors in the sector, and result in more efficient use of resources. The administration must become more customer oriented. Effective and customer-oriented administration will create preconditions for developing forest-based business and new entrepreneurship. In order to appropriately dismantle administrative and legislative obstacles that obstruct the development of entrepreneurship, close dialogue will be needed between companies and the administration.

The current data resources and, in particular, geographical information on forest resources are one of the competitive advantages of forest-based business and industries in Finland. The data resources on forests must be exploited more efficiently, as the collection of geographical information will benefit the entire sector. Currently, data is being collected in a number of different depositories, it is fragmented and sometimes poor in quality, and its accessibility is poor. In the future, it will be vital to create a communication and service portal which links the information systems of various branches of administration and through which geographical information can be accessed and utilised as widely as possible. Geographical information can be used to improve efficiency in such areas as timber procurement, marketing and provision of forest services, and the development of tourism. Sufficiently accurate and up-to-date geographical information is a precondition for the wider introduction of such services as electronic timber trade. Geographical information on forests also plays a role in forest accessibility (see Chapter 3.3.2).

While the on-going collection of forest resource data based on laser scanning will be completed as planned, preparations for developing a next generation data collection method are already under way. In the future, the administration will offer forest-based business and activities a second generation forest database in a forest information system that is based on evolving technologies and methods and that can be used in real time in the various processes of the actors. A precondition for achieving this will be compatible information systems, effective interfaces between the systems, and interaction between the administration and the actors with the aim of maintain the database as cost-effectively as possible.

Prolonged environmental permit procedures slow down investments and thus postpone the generation of new production. They also create uncertainty and reduce Finland's attraction as a target for investments. The turnaround time of these procedures can be speeded up, however without compromising on a good standard of environmental protection and risk management. For example, the procedures can be accelerated by developing the preliminary negotiation process.

In the context of statutory land use planning and zoning, opportunities will be created for developing diverse forestry business. Planning and zoning reconcile different land use needs from the perspective of overall benefit, not forgetting the requirements of additional use of renewable energy. Forestry operations should not be restricted by planning in areas with no particular needs to reconcile forest management and use with forestry and other business and activities or with particular societal needs. On the other hand, accessibility of forests for recreational and educational use should be accounted for in planning and zoning in urban areas. In the planning of tourist centres, good access to forests and trails located in them should be taken into consideration. In the Sámi homeland, traditional Sámi industries should be taken into account in land use planning and zoning, and in the planning and target-setting related to forestry.

Objectives:

- Administration, its cooperation and services support the competitiveness of the field and respond to customer needs.
- Forest-related information and statistics are open, comprehensive and up-to-date, which supports their broad utilisation.
- Permit procedures in the environmental administration are quick and flexible and they support the implementation of investment projects and maintain a high standard of environmental protection.
- Planning and zoning support the opportunities for forestry and diverse business.

The indicators describing the customer satisfaction rates of public organisations indicate how well the administration meets customer needs. Customer satisfaction is also affected by the effectiveness of administration and cooperation between different branches of administration. The operation of the administration is also described by indicators showing how efficiently forest-related data collected on public funding can be made accessible to various actors and industries.

Indicator	Initial level in 2013	Target level in 2025
Customer satisfaction trends of the Finnish Forest Centre, Metsähallitus and the Natural Resources Institute Finland		• Customer satisfaction improves
Share of forest resource data accessible to actors	• 15.5% of the collected forest resource data (October 2014)	• Increases significantly

3.3 Forests are in active, economically, ecologically and socially sustainable and diverse use

Healthy and abundant forests with a high level of biodiversity enable increasing and diverse forest use and ecosystem services. A precondition for increasing exploitation of renewable natural resources for bioeconomy needs is active, sustainable and diverse forest management and use. Reconciling various forest uses will facilitate obtaining growing welfare from the forests. Safeguarding the ecological and social sustainability of forests also plays a key role in ensuring that there will be a demand for the products and services of forest-based business and activities. Through voluntary forest certification schemes (PEFC, FSC), sustainability of forest management and use can be fostered.

3.3.1 Forestry is active and business-like

Some 60% of the Finnish forests are privately owned. Some of the forest properties included in this figure have been forgotten by their owners. It is important for forest-based business and activities that forest owners are encouraged to look after their property and make active choices concerning it from their personal points of departure, whether they choose commercial use, protection or landscape conservation. What matters is that the choice is made consciously and on mature reflection.

Active forest exploitation is a precondition for the supply of wood and new investments in forest-based business and activities (see Chapter 3.1.2). In order to promote more active commercial use of forests, preconditions need to be created for business-like forestry and thus improved profitability. In business-like forest ownership, an active approach, growth orientation and cost awareness are highlighted, and forest ownership is a main or a secondary source of livelihood. Earnings from wood production are emphasised in the activities of a business-like forest owner, but they can also include forest services and commercial exploitation of intangible ecosystem services.

Photo: Photo archive of Ministry of Agriculture and Forestry

Indicator	Initial level in 2013	Target level in 2025
The share of private forest properties and forests in joint ownership exceeding 50 ha in the total area	• 56% (private ownership) • 2.2% (joint ownership) (Natural Resources Institute Finland, 2012)	• total 70%
An incentive scheme for generation changes has been put in place. The age of the owner at generation change (once the mechanism has been created).		
Surface area covered by forest use declarations	• 752,940 ha (Finnish Forest Centre)	
Investment yields of wood production from private forests	• 4.2% (change in stumpage prices not included, Metla) • 4.1% (change in stumpage prices included, Natural Resources Institute Finland)	• Increasing
Early management of seedling stands and management of young stands (ha)	• no data available • 213,000 ha (management of seedling stands and young stands)	• 140,000 ha • Management needs indicated in the National Forest Inventory

The structure and ownership of forest properties in Finland are highly fragmented in many areas, and thus less than optimal from the perspective of profitable forestry. The average size of forest properties is small, or some 30 hectares, which adversely affects the profitability of forestry. As business-like forestry becomes more widespread, the average property size will grow and the average forest owner will be younger, which will also result in more active forest exploitation. The current age trend of forest owners is increasing, and adequate incentives for generation change should be created among other things. A larger property size will enable cost-effectiveness in forestry and promote possibilities of taking the natural values of forests into account when planning forest use.

Preconditions for active and business-like forestry must be created, for example, by developing taxation and improving the property and forest ownership structure. In active and appropriate forest management, forest owners may emphasise varying personal goals, including forest biodiversity. This is also a way of increasing and diversifying the potential earnings of forest owners. Active forest management and forestry investments will safeguard the growth potential of forests and reinforce the supply of wood and other forest-based products and services (see Chapter 3.1.2).

The forestry incentive scheme must support the forest policy objectives laid down in this strategy. The incentive scheme will help to safeguard sustainable forestry on peatland, encourage timely early management of seedling stands and the management of young forest, and promote a good nutrient balance of forests. The incentive scheme will also support preserving forest biodiversity and the development of forest road networks. Over the long term, the mechanism should in particular be geared towards activating forest owners and supporting non-market benefits and healthy forests. Forest policy should support new operating models for turning various ecosystem services in addition to wood production into commercial products and services.

Objectives:

- Active and business-like forestry increase, the size of forest properties grows and forest ownership structure supports active utilisation of forests.
- Incentive schemes for forestry are effective and activate forest owners.
- Opportunities of forest owners to engage in gainful activities increase through commercialisation of ecosystem services.

Of the indicators to be monitored, the share of forest properties exceeding 50 ha describes the potential for developing business-like forestry. Implementation of an incentive scheme for generation changes is a performance indicator for the National Forest Strategy, and monitoring the average age at which a forest owner retires and generation change takes place describes the functioning of the incentive scheme. Monitoring the profitability of forestry provides information on the existence of preconditions for active forestry. Level of activity and forward planning in forestry can also be gauged by monitoring the early management of seedling stands and the tending of young stands.

Photo: Markku Meriluoto

3.3.2 Forest biodiversity and ecological and social sustainability are reinforced

Natural capital comprises biodiversity and ecosystem services that the environment provides for humans. The ecosystem services are most commonly divided into productive, cultural, regulating and supporting services. The regulating and supporting services are associated with the functioning and processes of ecosystems. Safeguarding these strengthens ecological sustainability. Social sustainability, on the other hand, is especially linked with securing cultural services, including recreational use. Social sustainability encompasses employment, occupational welfare and updating of skills as well as versatile recreational use of forests. This chapter discusses social sustainability from perspectives other than employment or occupational welfare. Social sustainability also incorporates cultural sustainability. We must exploit our natural capital wisely, thus safeguarding future generations' possibilities of benefiting from ecosystem services. A key role in this is played by recognizing the interdependencies between various ecosystem services and safeguarding ecosystem services for future generations by managing them sustainably and drawing on scientific results.

The forest environment has a value in itself, in addition to which versatile forests with a high level of biodiversity are the ecological foundation on which all forest management and use is based. Fostering biodiversity is a key part of sustainable forest management. The National Forest Strategy supports the Convention on Biological Diversity (CBD) and the EU Biodiversity Strategy as well as Government Resolution on the Strategy for the Conservation and Sustainable Use of Biodiversity in Finland for the years 2012–2020, 'Saving Nature for People' (the so-called National Biodiversity Strategy) that is based on the aforementioned documents, and the Action Plan for implementing the Biodiversity Strategy. The aim of the strategy is halting the impoverishment of biodiversity by 2020 and securing a favourable status of forest biodiversity by 2050.

The forests are a primary habitat for more than a third of all the threatened species in Finland, and many structural features of habitats have changed as a result of forest management. Biodiversity has been fostered more efficiently since the 1990s, and loss of biodiversity in forest nature has been successfully slowed down. The impoverishment has not yet been halted, however, and action is still needed. Both conservation areas and nature management in commercial forests are needed to safeguard biodiversity in the forest environment. These measures also include restoration in compliance with the biodiversity strategy. Restoration of mires that are unsuitable for forestry should be a particular focus area. The management of commercial forests plays a key role in fostering biodiversity, as some 90% of our forests are available for forestry use. As most of the conservation areas are found in Northern Finland, more extensive protection of biodiversity than today is required, especially in southern parts of the country. Connectivity of forests can be promoted by good regional land use planning. The ecological sustainability of commercial forests should also be safeguarded as the volume of wood raw material and harvesting methods change, including the harvesting of energy wood.

On the other hand, some of the forest species have adapted to the changes brought about by forestry, and some have even benefited from them. For example, changes in the structural features of forests have diversified the game animal populations that are within the scope of sustainable use in Finland. The game animal populations are a growing resource that can be supported and maintained by careful forest management, allowing game husbandry to develop alongside with forestry. Developing nature management in commercial forests is also essential for game animals. Hunting is another significant form of recreational forest use. Depending on the calculation method, there are some 200,000–300,000 hunters in Finland.

The pollutant load and especially sediment discharges in water systems from forestry may have significant local impacts on the status of water bodies, especially in headwaters, small ponds and streams and in river systems with few lakes. More efficient forestry operations may increase this load. Climate change may also influence the erosion vulnerability of soil, and thus the pollutant load from forestry. In order to reduce this load, efficient water protection measures will be needed in all parts of the supply chain. The water protection measures needed in forestry are reviewed in management plans and programmes of measures adopted every six years by the Government, which are based on the EU Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy). For these planning efforts, guidelines for individual sectors have been drawn up in broad-based cooperation with stakeholders, for example, in the forestry sector.

The aim of climate change mitigation is minimising changes in the climate, and adaptation aims at resolving problems ensuing from climate change. In the forests, climate change mitigation and adaptation are supported by diversifying forest management. Over the long term, forest management techniques must be adapted to new and changing climate conditions. This will allow us to exploit the predicted positive impacts of climate change while minimising the risks associated with it. Timely and careful forest management can improve the resistance of growing stock to damage while safeguarding the ecosystem services of forests and producing wood biomass sustainably. Protection and conservation of the genetic resources of forest trees ensure the preservation of genetic variation in a species and its local populations far into the future. This way, tree species will preserve sufficient viability and adaptability also in changing climate conditions.

Forests as a carbon sink have been a significant means of mitigating climate change in Finland. Whereas the international benchmark level agreed upon for 2020 is 17–18 million tons in

carbon dioxide equivalent, the carbon sink has been larger than this as harvesting volumes have been lower than those indicated in the National Forest Programme 2015. As wood consumption increases, forests will lose their significance as carbon sinks, and emphasis in climate change mitigation will shift to replacing fossil raw materials by renewable ones, including wood.

The forests have always been a key part of our identify, history and culture from the times of hunter-gatherers till today's forest use and industries. The forests show plenty of traces of human activity, livelihoods and settlement. Some of these are visible in the forest landscape, some hidden in the soil. The forests are associated with plenty of stories and memories. The cultural environment is also a resource for developing businesses and industries. The cultural values of forests are thus a resource of great societal significance, which should be developed as cultural ecosystem services.

Research indicates that merely spending time in a forest has positive impacts on our mental and psychological health, and taking exercise in the forest brings further health benefits. Some 96% of Finnish people take outdoor exercise and around two million pick wild mushrooms. Encouraging citizens to spend more time in the forests can accentuate the well-being impacts produced by them. The proximity of a forest or a green area evens out socio-economic health differences and thus promotes equality. Easy access to forest and everyman's rights are the most important preconditions for availing of the impacts on well-being and health brought about by forests. Most of the recreational use takes place in commercial forests. A key role in the accessibility of forests is played by local forests, good trail networks and fixtures for outdoor exercise and hiking, as well as the availability of information through various modern media. Developing the use of state-owned hiking areas and national parks contributes to enabling a growth in recreational and well-being use as well as in nature and wildlife tourism. A precondition for increasing the health and well-being impacts of forests through spending time in them is that the benefits derived from nature are understood and consciously exploited by individuals, the community and society at large.

Appreciation of forest use and the forest environment has a direct impact on achieving the growth in welfare that the forest strategy vision aspires for. When forest use is ecologically sustainable, consumers retain a positive image of forest use, and the management and use of our renewing forest resources becomes a desirable part of Finland's transition towards a low-carbon society. While environmental awareness is gathering momentum, demographic changes – ageing of the population, urbanisation and multiculturalism – are changing

Indicator	Initial level in 2013	Target level in 2025
Genuine changes in classifications of threatened forest species	• Positive trend for 81 species • Negative trend for 108 species (Finnish Environment Institute, 2010)	• A positive trend has been recorded for twice as many species as a negative trend
Average volume of deadwood in forests • Southern Finland • Northern Finland	 • 3.8 m3/ha • 8.0 m3/ha (Natural Resources Institute Finland, National Forest Inventory 11 2009–2013)	 • 5 m^3/ha • 10–11 m^3/ha
METSO programme implementation (ha)	• 57,427 ha, of which Ministry of the Environment 28,798 ha and Ministry of Agriculture and Forestry 28,629 ha	• Ministry of the Environment: 96,000 ha, Ministry of Agriculture and Forestry: 82,000 ha (2008–2025)
Sediment discharges from drain network maintenance	• 57,000 t/year (2012)	• Declining
Annual carbon sink of growing stock in the forests and soil; reserve of wood products	• Carbon sink 29 million t CO2 eqv. (Natural Resources Institute Finland, preliminary data) • Data on carbon sequestration in wood products not available	• Carbon sink in 2025: 10-17 million t CO_2 eqv
Visitors to national parks and hiking areas, number of days spent hiking on state land; customer satisfaction	• 5.4 million visits to areas managed by Metsähallitus Natural Heritage Services, of which 2.6 million visits to national parks and hiking areas. • Visitors' customer satisfaction 4.3 (on a scale of 1–5). (Metsähallitus) • 400,000–500,000 days under some 150,000 permits	• Increasing • Maintained
Number of times exercise is taken locally (National Inventory of recreational use of nature)	• 156 times / year (Natural Resources Institute Finland, 2010)	• Increasing
Number of children and young people who take part in forest-themed events	• Children and young people: 308,843 Teachers: 13,378 These figures do not include scouts. (Finnish Forest Association)	• Increasing

our traditional relation with nature, setting challenges to reinforcing the appreciation of forest use and forest nature. A balanced relationship with the forest lays a foundation for sustainable forest management and use and its acceptability. The groundwork for forest use and appreciation of forest nature is laid in childhood, and developing a versatile understanding of forests in children and young people is a prerequisite for versatile forest use in the future. The accessibility of forests also plays a key role in building and keeping up a relationship with the forest; in this respect, local forests used by day-care centres and schools are of vital importance.

A report on science education published by the Ministry of Education and Culture (2014) finds that while Finnish people have a strong relationship with nature, the knowledge and, in particular, competence related to biodiversity on which this relationship is founded are eroding. In the core curriculum for basic education that is currently being prepared, the importance of providing children and young people with forest-related education has been stressed. Forest-related themes offer opportunities for creating learning units that link content learnt in different subjects as comprehensive schools introduce education based on the new core curricula in August 2016. Strong support from actors in forest-based business and activities will be needed to deliver teaching on this theme. The teaching materials must give a versatile idea of forest management and use.

NGOs play a key part in achieving the targets related to the recreational and well-being use of forests and developing citizens' relationship with the forests. Cooperation between the administration in charge of forest-based business and activities and NGOs should thus be developed.

Objectives:

- Impoverishment of forest biodiversity is halted by 2020 and a favourable status of forest biodiversity has been secured by 2050.
- Damages to waters caused by forestry have been minimised by using best available practices.
- Increasingly diverse sustainable forest management supports climate change mitigation and adaptation.
- Recreational use and health-promoting impacts of forests increase and forests are accessible to all.
- Appreciation of the use of forests and the forest environment is reinforced.

The first three of the aforementioned indicators describe the objective of halting forest biodiversity impoverishment. Genuine changes in classifications of threatened forest species are the best available indicator for trends in threatened species: are more species becoming threatened, or has this trend been halted? Lack of deadwood is the most important structural feature of the forest that results in species becoming threatened. By increasing the volume of deadwood we can influence both the halting of forest biodiversity impoverishment and the ecological status of forest habitats. Over the long term, the volume of deadwood must be increased in excess of the target level set for 2025. The number of forest conservation areas will be increased by means of the METSO programme and measures referred to in the Nature Conservation Act. As regards water protection in forestry, sedimentation discharges are the key factor that affects the status of water systems. In terms of climate change mitigation, the carbon sink, or the change in carbon sequestered in the forests, is an important element. The increase in recreational use is described by the number of visitors to areas managed by Metsähallitus Natural Heritage Services, including national parks and hiking areas, the number of days spent hiking on state land, and customer satisfaction. The number of children and young people taking part in forest-themed events, on the other hand, describes the potential for reinforcing forest use and appreciation of forest nature.

4 Strategic project portfolio derived from the objectives – Strategy implementation

4.1 Forest Strategy project portfolio

The strategic projects of the National Forest Strategy add up to a package geared towards facilitating a structural change in forest-based business and activities. Many projects in the structural package will have an impact on several different targets and strategic objectives. For example, improvement of electronic systems and more efficient utilisation of geographical information will promote active forest use, effective administration and the fostering of biodiversity. The strategic projects vary as to their scope, the parties responsible for their implementation and their timelines. Some of them may be implemented on a fast schedule, after which the potential need for further measures in the same thematic area should be assessed. Chapter 5, Organisation of strategy implementation and monitoring, contains a more detailed description of the process that will complement the strategic project portfolio as indicated by the needs of forest-based business and activities. The structural package of the National Forest Strategy consists of the following projects:

The prioritised measures must be completed in order to implement the strategy. In addition to these measures, actions that support the achievement of National Forest Strategy objectives are carried out every day as part of routine development efforts and implementation of other strategies and programmes (see Chapter 4.2). For example, the maintenance and continuous improvement of expertise in forest-based business and activities by means of education and training, advisory services and communication are a key part of all other activities. This strategy prioritises measures that would not be implemented in any of the other ways listed above.

A strategic project portfolio has been formed from the priority measures of the National Forest Strategy. By implementing these projects, better preconditions can be achieved for increasing the welfare produced by forest-based business and activities and for safeguarding economic, social and ecological sustainability. In order to implement these strategic projects, political will, competence and cooperation across sectoral boundaries and a new mentality within the sector will be needed. In addition, sufficient public funding will be required to implement certain strategic projects. These include investments in bioeconomy development, which will pay themselves back as new investments in business development, more active forest management and expanding service production. The preconditions for achieving the National Forest Strategy objectives also include the implementation of other strategies and programmes and the completion of projects that are already under way. In order to produce the best impact, communication about the results is important, ensuring that new knowledge is efficiently exploited.

Project	Description	Responsible parties	Timeline
A. Forest-related information and e-services of the future	The project will develop a next-generation forest-related information system and a process for keeping the information resources up to date. The Metsään.fi web service will be developed as an open portal for information and e-services that will support forestry entrepreneurship, cost-effective operation and growth of the forest service market while helping to keep forest-related information up to date. It will be a pioneering service in Europe for managing forest use and for the utilisation of geographical information in safeguarding biodiversity, cultural heritage and ecosystem services.	Responsibility: Ministry of Agriculture, Ministry of the Environment, Ministry of Finance Other actors: Finnish Forest Centre, Natural Resources Institute Finland, National Land Survey of Finland, Finnish Environment Institute, Metsähallitus, businesses in the sector, forest owners' representatives	2015–2020
B. Land use, planning and zoning in support of the forest-based business and activities	Clarifying the interfaces between the Forest Act and the Land Use and Building Act to eliminate overlaps in steering. Clarifying the procedures concerning permits for landscape work and planning regulations. Access to planning regulations in form of geographical information will also be organised.	Responsibility: Ministry of the Environment, Ministry of Agriculture and Forestry. Other actors: Association of Finnish Local and Regional Authorities, municipalities, Centres for Economic Development, Transport and the Environment, Finnish Forest Centre	2015–2016
C. Statistics on the renewing forest-based business and activities	Collection of statistics on the interfaces between the forest, energy and chemical industries, nature tourism, forestry-related services and other forest-based business and ecosystem services will be improved.	Responsibility: Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of the Environment Other actors: Statistics Finland, National Resources Institute Finland	2015–2017

Project	Description	Responsible parties	Timeline
D. Development of active forest management, entry of timber to the market and forest ownership structure	Underpinned by studies, forestry taxation and legislation will be developed to support active forest management, entry of timber to the market and a change in the forest ownership structure. Increasing property sizes and halting fragmentation will be promoted, among other things by developing legislation on joint forest ownership and new forms of forest ownership and by reducing the number of holdings owned by an estate.	Responsibility: Ministry of Agriculture and Forestry, Ministry of Finance	2015–2017
E. New incentive schemes and resource-efficient forest management	The project will prepare a future incentive scheme for forest management that promotes active and resource-efficient forest use and welfare derived from non-market benefits.	Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Finance	2016–2020
F. Research strategy for the forest-based business and activities	A research strategy will be prepared and implemented for forest-based business and activities, setting out the priority areas of fundamental and applied research in the sector. As part of research strategy implementation, a technology programme for forest-based business and activities will be implemented to improve the productivity of work carried out in the forests and to promote forestry-related service production.	Responsibility: Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of Education and Culture, Ministry of the Environment, Ministry of Social Affairs and Health Other actors: Natural Resources Institute Finland, Tekes, universities, Finnish Environment Institute, Academy of Finland, actors in the sector	2015
G. Transport infrastructure in support of the forest-based business and activities	A development programme for directing public investments to road networks, railway lines and terminals that specifically serve forest-based business and activities will be prepared and implemented.	Responsibility: Ministry of Transport and Communications, Ministry of Agriculture and Forestry, Ministry of Finance	2015–2020
H. New cooperation models between working life and training and education	The project will develop cooperation models between actors in forest-based business and activities and education and training organisations. The models will be relevant to the contents and marketing of occupations and education and training leading to them, as well as to developing companies' operations and the associated competence (for example, on-the-job learning, project work, RDI). Quantitative and qualitative anticipation of the education and training needs of forest-based business and activities and, as necessary, qualitative assessments of skills and labour availability will be carried out.	Responsibility: Ministry of Education and Culture, Ministry of Agriculture and Forestry Other actors: Finnish National Board of Education, education providers, companies and organisations in the sector	2015–2017
I. Nature management in commercial forests	Nature management in commercial forests will be developed as part of every-day routines with the aim of supporting biodiversity and ecosystem services. The project will also create capabilities and new incentives for more extensive introduction of nature management methods in commercial forests. A forest culture programme will be prepared as part of this project.	Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment Other actors: Actors in the sector, Finnish Forest Centre, Finnish Environment Institute, Natural Resources Institute Finland, National Board of Antiquities	2015–2018
J. Securing ecosystem services other than wood production and developing their markets	The project will promote securing ecosystem services other than wood production and developing their markets. It will collate information on various modes of forest use and their benefits, meanings and values as well as the links between them. Possibilities for and any administrative/legislative obstacles to introducing conservation or habitat banking and voluntary contractual operating models for safeguarding biodiversity, water protection, carbon sinks, game husbandry and the recreational values of the forests and for market development will also be investigated.	Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment Other actors: Actors in the sector, Finnish Forest Centre, Finnish Environment Institute, Natural Resources Institute Finland	2015–2018

Project	Description	Responsible parties	Timeline
K. Appreciation of Finnish forests	The project will create preconditions for boosting the appreciation of forest use and forest nature. Particular attention will be focused on strengthening the children and young people's relationship with the forest and promoting the acceptability of sustainable forest management. Measurement of and indicators for appreciation felt for forests will also be developed as part of this project.	Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment Other actors: Finnish Forest Centre, Finnish Forest Association, Natural Resources Institute Finland, universities, Finnish National Board of Education, nature and environment schools, NGOs, actors in the sector	2015–2018

More detailed project descriptions:

Strategic project	Project description
A. Forest-related information and e-services of the future Responsibility: Ministry of Agriculture, Ministry of the Environment, Ministry of Finance Other actors: Finnish Forest Centre, Natural Resources Institute Finland, National Land Survey of Finland, Finnish Environment Institute, Metsähallitus, businesses in the sector, forest owners' representatives	The project will develop a next-generation forest-related information system and a process for keeping the information resources up to date. The Metsään.fi web service will be developed as an open portal for information and e-services that will support forestry entrepreneurship, cost-effective operation and growth of the forest service market while helping to keep forest-related information up to date. It will be a pioneering service in Europe for managing forest use and for the utilisation of geographical information in safeguarding biodiversity, cultural heritage and ecosystem services.

The project will promote the achievement of all three strategic objectives of the National Forest Strategy. It will design and implement a next-generation forest-related information system that will increase the efficiency of forest use, promote the profitability and cost-effectiveness of forestry and improve administrative processes while safeguarding forest biodiversity. As the end result, a forest database will be created for forest-based business and activities that supports effective operation in the planning and implementation of forest use. In the design of the future system, possibilities offered by new technologies, information needs of forest owners and other actors, and efficient updating of information in connection with daily routines will be addressed. Preconditions for compatibility between the administration's forest-related information system and the actor's information systems and utilisation of interface services between the systems include uniform data standards, maintenance of these standards, and clear ideas about the ownership of the data. In this context, needs to amend legislation relevant to geographical information will also be examined.

The Metsään.fi web service will be developed as a key information portal through which the forest-related database can be accessed. Metsään.fi will be turned into an open information and e-service portal serving forest owners, the administration and a wide range of actors in forest-related business and activities, through which diverse geographical information may be utilised, including forest resource data, planning and zoning material and the environmental administration's data sets. Data that is efficiently exploited and kept up to date will promote profitability in forestry, forestry entrepreneurship, active and versatile forest use, availability of raw material for industries using timber and wood, the safeguarding of biodiversity and the minimisation of damage to water systems caused by forestry. Access to versatile information will also enable private-sector application development and thus the development of commercial products.

The creation of an e-service portal will enable effortless cooperation of forest owners and other actors with the administration, for example, in the context of METSO programme implementation or forestry operations. The administration's electronic systems should also be developed to increase the efficiency of its operations and to allow the actors to draw on the potential offered by digitalisation and geographical information in their own operative activities.

Strategic project	Project description
B. Land use, planning and zoning in support of the forest-based business and activities Responsibility: Ministry of the Environment, Ministry of Agriculture and Forestry Other actors: Association of Finnish Local and Regional Authorities, municipalities, Centres for Economic Development, Transport and the Environment, Finnish Forest Centre	Clarifying the interfaces between the Forest Act and the Land Use and Building Act to eliminate overlaps in steering. Clarifying the procedures concerning permits for landscape work and planning regulations Access to plans in form of geographical information will also be organised.

The project will develop operating methods for increasing expertise in forest-based business and activities in the planning efforts of municipalities and regional councils, reduce overlaps in administrative steering and encourage cooperation between different branches of administration. Forest-based business and activities will actively take part in planning processes, and when new plans that concern forest areas are being prepared, the impacts of these plans on forestry will be assessed. Development of the planning process will promote the achievement of the second and third objectives of the National Forest Strategy. Local master plans should direct the general outlines of land use. Only areas affected by needs for land use planning and reconciliation of various land use forms should be included in the area covered by a local master plan. The ministries will work together to develop the permit procedure for landscape work and other direction of planning and zoning. The project will clarify the interfaces between the Forest Act and the Land Use and Building Act to eliminate overlaps in steering.

Forests close to urban areas have a key role in terms of access to forests, the impacts of forests on health and well-being, and the development of the citizens' relationship with the forest. The project will examine how local forests near urban areas and recreational trails can be safeguarded in planning and zoning. The project will also examine if the increasing use of renewable energies will result in needs to develop planning.

Strategic project	Project description
C. Statistics on the renewing forest-based business and activities Responsibility: Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of the Environment Other actors: Statistics Finland, Natural Resources Institute Finland	Collection of statistics on the interfaces between the forest, energy and chemical industries, nature tourism, forestry-related services and other forest-based business and ecosystem services will be improved.

As forest-based business and activities are diversifying and expanding, the collection of statistics on the sector should also be developed. There are gaps in the statistics on other ecosystem services than those related to timber production, which slows down efforts to safeguard, productise and commercialise them. Data describing the social and economic dimensions of services for forest-based business and activities is lacking, and their significance may thus be overlooked in decision-making. Reliable statistics on nature tourism, for example, are not currently available. Additionally, statistics on wood processing industries are based on outdated sectoral boundaries, and the statistics thus no longer describe the current status of forest-based business and activities.

Strategic project	Project description
D. Development of active forest management, entry of timber to the market and forest ownership structure Responsibility: Ministry of Agriculture and Forestry, Ministry of Finance	Underpinned by studies, forestry taxation and legislation will be developed to support active forest management, entry of timber to the market and a change in the forest ownership structure. Increasing property sizes and halting fragmentation will be promoted, among other things by developing legislation on joint forest ownership and new forms of forest ownership and by reducing the number of holdings owned by an estate.

The main objective of the project is to encourage active forest management and to promote the entry of timber to the market in response to growing bioeconomy needs. The project would promote the achievement of the first and third National Forest Strategy objective.

Key measures will include developing the taxation of forestry and legislation that influences the ownership structure as indicated by studies. These measures are necessary to build up the supply of wood and to meet the needs of growing consumption and to boost active and business-like forestry. The aims of efforts to develop ownership structure include increasing property sizes, halting fragmentation and accelerating generation change. For example, the project would amend the current Act on Jointly Owned Forests, making the establishment of jointly owned forests easier and lightening the administrative burden, and the real estate formation legislation. Ownership based on a joint-stock company would be developed to better accommodate the special features of forestry. The project will also create an efficient incentive scheme to facilitate generation changes and develop steering that seeks to reduce the number of properties owned by estates.

Strategic project	Project description
E. New incentive schemes and resource-efficient forest management Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Finance	The project will prepare a future incentive scheme for forest management that promotes active and resource-efficient forest use and welfare derived from non-market benefits.

The project would prepare a forestry incentive scheme for the 2020s that would, in particular, promote active, sustainable and diverse use of forests in keeping with the third strategic objective of the National Forest Strategy. The incentive scheme must be predictable and have a long time span. The models that the project would examine include a support system pursuant to the current Act on the Financing of Sustainable Forestry, providing tax incentives that encourage active forest use, strengthening the role of guidance by information, and shifting the focus to supporting development projects and innovations. The incentive scheme will promote timely management of seedling stands, use of improved seedlings and looking after forest health. In particular, the incentive scheme must safeguard the production of non-market benefits, including environmental benefits.

Strategic project	Project description
F. Research strategy for the forest-based business and activities Responsibility: Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of Education and Culture, Ministry of the Environment, Ministry of Social Affairs and Health Other actors: Natural Resources Institute Finland, Tekes, universities, Finnish Environment Institute, Academy of Finland, actors in the sector	A research strategy will be prepared and implemented for forest-based business and activities, setting out the priority areas of fundamental and applied research in the sector. As part of research strategy implementation, a technology programme for forest-based business and activities will be implemented to improve the productivity of work carried out in the forests and to promote forestry-related service production.

The research strategy for forest-based business and activities will add detail to the research policies of the Bioeconomy Strategy while also gathering together the needs relevant to forest-based business and activities expressed in various strategies. Research strategy implementation will promote the achievement of the second National Forest Strategy objective. The research strategy will identify priority areas of research, propose a process for enhancing the performance of research, and specify a division of responsibilities for different areas of research in higher education institutions, research institutes and expert organisations. Preparation of the research strategy will draw on other on-going processes, the results of the evaluation and foresight project carried out by the Academy of Finland together with the Ministry of Agriculture and Forestry in 2014 concerning current bioeconomy research and future research needs in this sector, and the data and reports produced in the State of Scientific Research 2014 process.

As part of research strategy implementation, a technology programme relevant to forest-based business and activities will be realised, which will promote the productivity of operations in the forests and, in particular, the mechanisation of forest management work. In the forestry sector, the productivity of timber harvesting has improved many-fold over the last few decades, whereas similar development has not taken place in wood production. Improving productivity will support active and business-like forest management and preserving the growth potential of the forests. Promotion of productivity will also support the preconditions for services and enterprising related to forest management.

Strategic project	Project description
G. Transport infrastructure in support of the forest-based business and activities Responsibility: Ministry of Transport and Communications, Ministry of Agriculture and Forestry, Ministry of Finance	A development programme for directing public investments to road networks, railway lines and terminals that specifically serve forest-based business and activities in particular will be prepared and implemented.

The project will improve the service capacity of the transport network and terminals. The development programme aims to secure competitive transportation for forest-based business and activities in Finland and improve the prerequisites for controlling the seasonal nature of the business. Improving the transport network service capacity will also create preconditions for other forest-based entrepreneurship and recreational use of the forests as well as help to preserve the viability of rural areas. The strategic project will contribute to active forest use and improve the competitiveness of Finnish forest-based business and activities. In particular, the development programme will focus on maintaining and developing the secondary road network and bridges and prioritising development needs. Development and maintenance of the secondary road networks and bridge renovations are necessary in view of the increased maximum loads of timber trucks. A well-maintained secondary road network also is a precondition for many other emerging bioeconomy industries. The development programme also aims for more efficient use of public funding.

Strategic project	Project description
H. New cooperation models between working life and training and education Responsibility: Ministry of Education and Culture, Ministry of Agriculture and Forestry Other actors: Finnish National Board of Education, education providers, companies and organisations in the sector	The project will develop cooperation models between actors in forest-based business and activities and education and training organisations. The models will be relevant to the contents and marketing of occupations and education and training leading to them, as well as to developing companies' operations and the associated competence (for example, on-the-job learning, project work, RDI). Quantitative and qualitative anticipation of the education and training needs of forest-based business and activities and, as necessary, qualitative assessments of skills and labour availability will be carried out.

The project aims for upskilling those working in forest-based business and activities or pursuing studies relevant to the sector and for increasing the attraction of the sector. Education and training must work together with the working life to promote the image of the sector with adequate impact, and shared operating models must be developed. The goal of working life driven skills development is to improve the sector's competitiveness in a changing operating environment. Closer cooperation will promote the upskilling of those working in forest-based business and industries, whether they have received education and training relevant to the sector or are entering the sector from outside its conventional spheres. More effective working life oriented modules in studies relevant to forest-based business and activities will also benefit the social partners. The project is linked with the upper secondary education reform being prepared by the Ministry of Education and Culture.

Strategic project	Project description
I. Nature management in commercial forests Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment Other actors: Actors in the sector, Finnish Forest Centre, Finnish Environment Institute, Natural Resources Institute Finland, National Board of Antiquities	Nature management in commercial forests will be developed as part of every-day routines with the aim of supporting biodiversity and ecosystem services. The project will also create capabilities and new incentives for more extensive introduction of nature management methods in commercial forests. A forest culture programme will be prepared as part of this project.

Some 90% of our forests are available for forestry, and the management of commercial forests thus plays a key role in safeguarding forest biodiversity and ecosystem services. Nature management in commercial forests also includes water protection, the management of game animals and protecting the cultural heritage of forests and, in more general terms, ecosystem services. Nature management techniques in commercial forests should be more widely introduced as part of so-called every-day forest management. While the new forest management recommendations also contain guidelines for nature management in commercial forests, their implementation must be further supported by more detailed instructions and advice. For example, ensuring that retention trees are left standing in a felling is important in the context of diversifying forest management techniques. Division of labour between various actors and customer service practices must be clarified.

In spring 2014, the Government adopted Finland's Cultural Environment Strategy for 2014–2020. However, this strategy does not include forests as cultural environments. It is thus necessary to draw up a forest culture programme which will, for example, specify why the cultural heritage of forests should be cared for from the perspective of responsible and methodical ownership.

Strategic project	Project description
J. Securing ecosystem services other than wood production and developing their markets Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment Other actors: Actors in the sector, Finnish Forest Centre, Finnish Environment Institute, Natural Resources Institute Finland	The project will promote securing ecosystem services other than wood production and developing their markets. It will collate information on various modes of forest use and their benefits, meanings and values as well as the links between them. Possibilities for and any administrative/legislative obstacles to introducing conservation or habitat banking and voluntary contractual operating models for safeguarding biodiversity, water protection, carbon sinks, game husbandry and recreational values of the forests and for market development will also be investigated.

Photo: Markku Meriluoto

The significance of ecosystem services for human well-being may be greater than the monetary value they represent. This value is often underestimated, as regulating, supporting and cultural services in particular are non-market services. The benefits of ecosystem services may, for example, be experienced as economic security, better health or a beautiful landscape. Information about the value of various ecosystem services is fragmented, however, and the value of the forests may thus seem small when examined from each individual perspective. For example, we do not have enough information about the value of forests in terms of recreational use, health, retention of stormwaters and air purification. In terms of the acceptability of forest policy, it is important to be conscious of the different types of values when making decisions. The project will develop indicators for ecosystem services other than wood production. The most important ecosystem services that it is vital to safeguard and the measures required to support and reinforce them must be identified in each region. The information collected and established in this project will also be used for the drawing up of the forest culture programme.

In order to safeguard ecosystem services and to create possibilities for the commercialisation of new ecosystem services, the significance of these services for the national economy and links between various ecosystem services related to forests, or interdependencies, must be known better than today. The commercialisation of new ecosystem services may increase forest owners' opportunities for earning an income and thus create alternative modes of forest use in addition to wood production. The potential for and possible administrative obstacles to setting up consevation or habitat banking, voluntary contractual operating models or other new operating methods should be investigated and piloted, making it possible to safeguard ecosystem services and, if necessary, create markets for them.

Strategic project	Project description
K. Appreciation of Finnish Forests Responsibility: Ministry of Agriculture and Forestry, Ministry of the Environment Other actors: Finnish Forest Centre, Finnish Forest Association, Natural Resources Institute Finland, universities, Finnish National Board of Education, nature and environment schools, NGOs, actors in the sector	The project will create preconditions for boosting the appreciation of forest use and forest nature. Particular attention will be focused on strengthening the children and young people's relationship with the forest and promoting the acceptability of sustainable forest management. Measurement of and indicators for appreciation felt for forests will also be developed as part of this project.

A high level of appreciation of forests and forest use is a fundamental precondition for achieving all three objectives of the National Forest Strategy. A sustainable relationship with the forest is built slowly, and it changes and evolves over time. We do not know enough about how the relationship with the forest is established at various ages to provide us with adequate tools for lifelong reinforcement of this relationship. The project will study the way in which people establish a relationship with

the forest at various ages and, on this basis, create tools for reinforcing this relationship, especially at sensitive ages (in early childhood, childhood and youth) and at the time of life changes.

It will also produce support material that schools can use to create learning units which link the content learnt in different subjects in keeping with the new curricula. It is vital that the materials used in teaching give a versatile idea of forest management and use. When producing material for forest-related education, attention should be paid to the possibilities provided by new techniques and advancing communication technology. The materials and other activities created should be experiential, encourage learning by doing and interest both sexes.

Doing, experiencing and spending time in the forest thus are a key element in building a relationship with the forests, especially for children and young people. Actors in forest-based business and activities, including the third sector, will support the forest education activities of schools and day-care centres. In order to promote the achievement of National Forest Strategy objectives, it is necessary to also invest in NGO cooperation with organisations which operate outside the conventional forestry sector but which have strong links with forest-based business and activities. By implementing pilot projects of forest education, including a forest education campaign, cooperation between actors in forest-based business and activities and day-care centres, schools and educational institutions may be promoted, and the development of young people's relationship with the forest during their free time can be encouraged.

Appreciation of forests and forest use is also a precondition for sustainable forest management being acceptable and desirable. Acceptability is influenced by a good and active relationship with the forest on one hand, and the manner in which the various aspects of sustainability have been accounted for in a balanced way in forest management on the other. Once Finnish people have a versatile understanding of sustainable forest management, it will be easier for us to also communicate about it internationally and at the EU level.

4.2 Achievement of objectives relevant to forest-based business and activities through other strategies and programmes

In addition to the strategic projects of the National Forest Strategy, many other strategies and programmes contribute to promoting the Forest Strategy objectives. Particular attention should be paid to the coordination and compatibility of and interfaces between the National Forest Strategy and other strategies. Proactive lobbying in the EU and continuous dialogue between the ministries and business life, in which all of the various sectors exploiting forests can take part, will also play a key role.

Implementation of the Bioeconomy Strategy, the Energy Strategy and the Climate Strategy have substantial links with achieving the objectives of the National Forest Strategy. Of the Bioeconomy Strategy measures, in particular increasing capital funding for and innovation investments in the bioeconomy and financing the piloting and demonstrations of new bioeconomy solutions will promote renewal in forest-based business and activities. In addition, highlighting bioeconomy as part of Finland's country image will support growth and development in the sector.

Safeguarding forest biodiversity and the preservation of habitats for endangered forest species are supported by the resolution adopted by the Government on extending the Forest Biodiversity Programme for Southern Finland (METSO) to 2014–2025. The METSO programme is a key instrument in halting the impoverishment of biodiversity and ensuring a favourable status of forest biodiversity. Implementing the quality and surface area targets of the METSO programme will be crucial. The use of environmental and forest resource data to channel financing under the METSO programme in the ecologically most appropriate manner and to nature management projects should be improved. Another central strategy relevant to biodiversity is Government Resolution on the Strategy for the Conservation and Sustainable Use of Biodiversity in Finland for the years 2012–2020, 'Saving Nature for People' (the so-called National Biodiversity Strategy) and the associated Action Plan. Within the framework of these strategies, an evaluation of shortcomings and development needs of conservation will be produced to develop the network of conservation areas and its management, accounting for the impacts of climate change among other things. Thirdly, Government Resolution on Sustainable Use and Conservation of Mires and Peatland is relevant to safeguarding biodiversity.

Water protection measures in forestry will be carried out following the implementation programme for water resource management plans. Of particular importance will be introducing an operating model for planning at the level of catchment basins and the planning of treatment wetlands and wetlands, developing and utilising a monitoring network for pollutant loading in water systems from forestry, and updating and introducing operating models and instructions for managing sediment discharges from forestry. Restoration of small water bodies will be carried out as part of forest environment management.

The Rural Policy Committee works to promote business and industries in rural areas. The Rural Policy Programme 2014–2020 will contribute to the achievement of National Forest Strategy objectives in the context of infrastructures, planning and zoning, promoting entrepreneurship and ecosystem services. Business and development funding under the Rural Development Programme for Mainland Finland 2014-2020 can be exploited in a versatile manner for promoting competence and innovations, diversification of rural business and producing environmental benefits. This necessitates communication about the possibilities offered by project funding and active participation by the stakeholders.

The Finnish National Commission on Sustainable Development has produced a document titled The Finland we want by 2050 – Society's commitment to sustainable development. National

Forest Strategy implementation can promote the following objectives of the Commitment in particular: sustainable work, a carbon-neutral society, an economy that is resource-wise, and decision-making that respects nature. In order to fulfil this commitment, administrative branches and other actors in society will give their own commitments. Where these commitments are relevant to the objectives set in the National Forest Strategy, their implementation can also promote the achievement of Forest Strategy objectives at the practical level.

Drafting related to EU forest issues is coordinated by EU Forest Section under the Ministry of Agriculture and Forestry's Natural Resources Department. The section comprises representatives of not only ministries but also key stakeholders, and it disseminates information about topical EU issues and formulates Finland's positions on such questions as those discussed by the Commission's Standing Forestry Committee. It also plans Finland's efforts to exert influence at EU level in questions that are of importance to Finland. In international forest issues, the Ministry is assisted by a group consisting of public servants in various ministries which prepares Finland's positions for different international processes and, for example, meetings of the Council Working Party on Forests. Finland acts proactively in EU and international forest issues, extensively drawing on the expertise of our forest sector and in close cooperation with experts in other countries. As part of their official duties, the public servants exert influence to ensure that EU and international energy and climate policies reflect the actual climate benefits of forests, sustainable forestry and wood-based products and that wood-based fuels would continue to be regarded as renewable energy sources with zero emissions in energy production.

Themes of forest-related cooperation set out in the Development Policy Guidelines for forest sector include right to forest use, decision-making and just distribution of benefits, forests as a source of fuelwood and energy, forest sector value chains, sustainable production and use, national forest programmes and good governance, the role of forests in mitigating climate change and forests as part of the environment and land use. Finland's partners in forest sector development cooperation include Tanzania, Kenya, Zambia, Nepal, Vietnam and Laos.

The Ministry of Education and Culture is preparing a reform of vocational upper secondary education and training relevant to forest-based business and activities, in which context operator training in the sector will also be scrutinised. Pursuant to the Decree on the Development Plan for Education and University Research (987/1998), the Government adopts every four years a plan for developing education in the administrative branch of the Ministry of Education and Culture and research carried out at universities for the year in which the decision is made and the following five calendar years. A new development plan for education that covers all forms of education and training will be completed in spring 2016. The Ministry of Education is also developing measures relevant to on-the-job learning, including a reform of on-the-job learning and apprenticeship training for young people.

5 Organisation of strategy implementation and monitoring

Adopted as a Government Resolution, the National Forest Strategy 2025 directs the activities of various ministries and their branches of administration in their efforts to implement strategic projects. National Forest Strategy implementation and monitoring will be coordinated by the Ministry of Agriculture and Forestry. Its implementation will also be promoted by the Forest Council, its working committee and steering groups set up around the strategic projects whose terms of office will vary in different thematic areas. Steering group members will include representatives of both the administration and stakeholders. It is essential that these groups have extensive expertise in all areas of forest-based business and activities. If necessary, working groups to address wider thematic areas may be appointed to evaluate, plan and promote strategy implementation. The monitoring of strategic projects may also rely on working groups set up under other programmes and strategies as well as the EU Forest Section under the Ministry of Agriculture and Forestry and working group on international natural resource policy to be set up.

Several ministries will participate in the implementation of the National Forest Strategy. The Ministry of Employment and the Economy will assume special responsibility for developing the operating environment for forest-based business. These efforts will be supported by funding for development projects and businesses granted under the Rural Development Programme for Mainland Finland implemented in the administrative branch of the Ministry of Agriculture and Forestry. The Ministry of Transport and Communications has a major role in infrastructure development, whereas the Ministry of Education and Culture will develop education, training and research. The Ministry of the Environment, on the other hand, is responsible for issues related to planning, environmental permits, biodiversity and water and climate protection. Trade policy associated with international forest issues and implementation of the Development Policy Guidelines for forest sector are within the remit of the Ministry for Foreign Affairs.

The National Forest Strategy will be implemented in 2015–2025, taking into account any pressures for change arising from programme monitoring, interim evaluations and government programme policies. Regional forest programmes underpinned by the National Forest Strategy for 2015–2020 will be prepared by the end of 2015. The regional forest programmes will contribute to National Forest Strategy implementation and the achievement of its objectives.

The Forest Council will annually review the implementation of strategy objectives and progress made in strategic projects. The

Photo: Photo archive of the Ministry of Agriculture and Forestry

National Forest Strategy indicators mainly measure impact. By analysing the indicators and objective achievement in relation to changes in the operating environment, the National Forest Strategy's impact can be evaluated in connection with the annual monitoring exercise. The most urgent projects in terms of achieving the National Forest Strategy objectives have been collected in the project portfolio. The needs to set up new projects will be assessed every year. If necessary, the Forest Council will propose new projects if the operating environment of forest-based business and activities indicates that an update of the project portfolio is needed in order to promote the achievement of National Forest Strategy objectives. External interim evaluations of the National Forest Strategy will also be produced as required.

6 Financing of the strategy

Questions concerning the financing of the strategic projects contained in the National Forest Strategy will be discussed and decided annually as part of the central government's spending limit and budget processes. The Strategy objectives will provide the groundwork for preparing central government financial plans and the spending limits and budgets that are part of them. The strategy will be implemented within this framework. If necessary, the financing policies will be discussed in the Cabinet Committee on Economic Policy. EU project funding may also be applied for to implement projects.

7 Strategy impacts

The impact assessment was drawn up by research officers Riitta Hänninen and Jussi Uusivuori from the Natural Resource Institute Finland.

7.1 Objective and implementation of the impact assessment

The National Forest Strategy contains priority objectives and more detailed measures aiming to achieve the strategic objectives set in the Government Report on Forest Policy. The objectives and key packages of measures of the National Forest Strategy 2025 are based on the Government Report on Forest Policy 2050. Their impacts were assessed in connection with the Forest Policy Report.

This impact assessment looks at the economic, social and environmental impacts of the National Forest Strategy and factors of uncertainty affecting the achievement of the objectives. National Forest Strategy implementation will rely on a project portfolio, which will be assessed separately. In comparison with the National Forest Strategy's predecessors, or the National Forest Programmes, the strategic project portfolio represents a new kind of thinking.

7.2 Economic, social and environmental impacts of the National Forest Strategy

7.2.1 Economic impacts

The central government strives to use the National Forest Strategy to create preconditions for an expanding forest-based bioeconomy and more diverse welfare. While the development of new wood-based bioeconomy products is making headway in the pulp and paper industry and the use of wood-based energy is increasing, the production of forest-based industries will in the next few years to a great extent continue relying on the current conventional products. Bringing new bio-based products into the market will take time, and in the transition phase, development will be financed by the more conventional products.

While the declining demand for paper has reduced the production volumes of printing paper, the production volumes of high-quality paperboard have grown in recent years, and

Photo: Lauri Karvonen

pulp production is expanding. New investment activity is also stirring in the wood products industry, and the increase in the construction of timber-frame apartment blocks also lays a foundation for the more extensive production of prefabricated elements (CLT) in Finland. Plans are under way to design and build the first large-scale bio-refinery in Äänekoski, production of commercial bio-diesel is about to start in Lappeenranta, and other investments are also on the way.

In addition to an increase in the value added and turnover of forest-base business and activities, National Forest Strategy targets include achieving a growth of 15 million cubic metres in the total harvesting volume of stemwood by 2025. As a result of the structural change in forestry, the value added of the production will go up, and the investment plans publicised so far will already increase industrial wood use by millions of cubic metres. In addition, Finland's Energy and Climate Strategy contains the target of a 25 TWh increase in heat and electricity production from forest chips by 2020. More efficient timber purchasing and forest use will be needed to meet the additional demand for wood.

An increase in the total roundwood removal would have significant economic impacts, especially at the regional level. The gross stumpage earnings from privately owned forests and the turnover of harvesting and transport entrepreneurs would go up. In 2013, the gross stumpage earnings from private forests amounted to some EUR 1.6 billion. A higher consumption of wood would increase the central government's direct annual tax revenue as a result of the higher stumpage earnings and increased earned income in the transport sector. To enable a macro-economic assessment, more accurate target indicators would have to be designed, and the impacts of market adjustment would need to be calculated.

Regarding forest-based intangible services, the economic significance of nature tourism and recreational use has grown in recent years, and the National Forest Strategy relies on their continued rapid growth. In 2013, the value added of tourism in Finland was put at some EUR 4.4 billion, of which nature tourism is estimated to account for some one fourth.

The National Forest Strategy aspires for a level of investments in the use of wood raw material that exceeds the level of depreciations. This would ensure that production capacity would remain at least at its current level.

In increasing the surface areas of forest holdings, the goal for 2025 is that in the total surface area of forests, the share of private forest properties and jointly owned forests exceeding 50 hectares will go up from the current figure of approx. 58% to 70%. An increase in forest property areas would undoubtedly result in more effective forestry operations and higher profitability. A comprehensive study of the economies of scale produced by increasing property sizes would yield more accurate information about the magnitude of these impacts.

7.2.2 Social impacts

Higher productivity, rationalisation of production, structural changes in demand in the export markets and the economic recession of recent years have reduced the employment rate in forest industry by about one third since 2000. In forestry, on the other hand, changes in the employment rate have been relatively minor, as the total roundwood removal and harvesting of wood for energy have increased and harvesting increasingly focuses on pulpwood.

If the National Forest Strategy objectives were achieved, this would promote positive regional development and the viability of rural areas. An increase in the harvesting and transport of roundwood and wood for energy, forest management, forest improvement work and energy production will create a need for more labour in the forestry sector. The repairs to and maintenance of transport networks would also require labour. A change in the structure of forest owners and the new Forest Act, which gives forest owners more freedom in managing their forests, will contribute to increasing the demand for forest services and forest service companies that perform forest and nature management work. However, higher productivity as the work becomes mechanised will considerably reduce the need for labour.

In order to produce a macro-economic assessment of the employment impacts, a calculation of the indirect impacts of market adjustment would also be required. Some of the new jobs will make up for those lost in the aftermath of the structural change in forest-based business and activities. Over the long term, increasing amounts of new growth and employment will emerge on the interfaces between the traditional forestry sectors and other fields. In order to keep up with this trend, the National Forest Strategy's project portfolio contains a measure that seeks to develop the collection of statistics on the renewing forest-based business and activities.

The National Forest Strategy strives for an increase in visitor numbers to national parks and hiking areas and better customer satisfaction of the visitors, which will also increase service needs. It is estimated that the employment impacts of nature tourism enterprises in Finland is some 27,000 person-years, of which accommodation accounts for about one half. Nature tourism already is a significant source of employment in Lapland, Kuusamo and Kainuu, and hiking areas in Southern Finland will also be used more intensively. Monitoring the trends in nature tourism is difficult because of gaps in statistics; the National Forests Strategy seeks to rectify this situation by means of project portfolio measures.

More wide-spread recreational use of forests will promote the mental and physical well-being of the citizens. The National Forest Strategy's aims of increasing the number of visits to local forests and the participation of children and young people in forest-related events will contribute to supporting citizens'

relationship with nature, appreciation of versatile forest use, and interest in education, training and research in this field. Acceptance of and education, training and high-quality research related to diverse forest use are preconditions for forest-based bioeconomy making headway in Finland.

7.2.3 Environmental impacts

The National Forest Strategy's environmental impacts have close links with an increase in the felling and harvesting volumes of roundwood and wood for energy. While the increasing felling volumes risk to increase the number of threatened species, an attempt is being made to alleviate the situation by means of the forest biodiversity programme METSO. A greater surface area of forests protected under biological criteria will promote the preservation of species and safeguard biodiversity. In commercial forests, the negative impacts may be reduced by ensuring that adequate training for forestry professionals and advice for forest owners are available.

Were the objectives of the National Forest Strategy achieved, this would significantly support the EU targets of increasing renewable energy use. An increase in the use of forest chips from 8.7 million cubic metres in 2013 (includes consumption by small-scale housing of 0.7 million m3) to 15 million cubic metres by 2025 would increase the share of renewable energy sources in the total consumption of primary energy. On the other hand, the increasing use of wood for energy is associated with risks in stump removal in regeneration and in whole-tree removal at thinnings. The removal of branches, needles and stumps removes nutrients from the forest soil as well as deadwood that prevents biodiversity loss. In order to reduce the harmful impacts of increased harvesting volumes, the National Forest Strategy contains the objectives of reducing sediment discharges (in drain network maintenance) and increasing the average volume of deadwood on forest and on poorly productive forest land by 2025.

As long as the annual increment exceeds the harvesting volumes, the forests will act as carbon sinks. However, increasing harvesting volumes will reduce the carbon sink impact of forests and soil.

In the context of exerting influence on EU and international forest policy, the National Forest Strategy assumes that wood fuels will continue to be counted as zero emission energy: the carbon dioxide released when burning wood is seen as being re-sequestered in growing stock. However, the length of the period under scrutiny has a bearing on the extent to which emissions are reduced per quantity of energy produced. More detailed research will be required, however, concerning the role of wood fuels and forest use in terms of climate change.

Regeneration fellings are seen as having negative impacts on forest landscapes, for example, in nature tourism. These impacts may, however, be alleviated by landscape planning. The impacts of more wide-spread thinnings and use of wood for energy on recreational forest uses are considered positive, excluding the harvesting of stumps.

7.3 Factors of uncertainty

The operating environment of forest-based business and activities is currently being influenced by a number of significant global trends of change that are beyond our control in Finland. The demand for and prices of forest industry end products are determined in the global market, which has an impact on the production and exports of the Finnish forest industry.

Reaching the targeted harvesting volumes is linked with demand in the end product market and will depend on the reactions of actors in forest-based business and activities, the forest industry and forest owners to varying market situations and future outlook. Uncertainties are associated with both the demand for and supply of timber. Actors' confidence in the operating environment of the forest industry in Finland remaining competitive is important when decisions on continuation of various lines of production and new productive investments in Finland are being made.

Achievement of Finland's energy and climate targets, which has close links with forest industry production, is also uncertain. The forest industry produces a major share of the renewable energy in Finland, and the supply of forest chips is dependent on the harvesting of roundwood for the industries. On the other hand, the use of wood for energy is also influenced by the prices of other energy sources and the state aid policy. Last year, coal obtained at a lower price replaced forest chips in some Finnish heating and energy plants. It also remains to be seen to what extent the dropping price of crude oil will affect the use of renewable energies, and how long the oil price keeps decreasing.

The renewal of forest-based business and activities and the development of new forest-based products and services will take years, and innovations will be created especially on the interfaces between forest-based business and activities and other sectors. While public financing will contribute to enabling research and development fraught with risks, it is uncertain whether research appropriations will remain at their current levels. As forest-based business and activities renew and working life changes, the availability of skilled labour is a risk, and in this respect, it is important that the project portfolio measures concerning cooperation models between education and working life will be implemented.

Increasing forest use exacerbates the risk of forest species becoming threatened. These risks may be mitigated by means of measures under the METSO programme aiming to safeguard

forest biodiversity. However, the adequacy of public funding to pay compensation for protection measures under METSO, forest owners' willingness to conserve their forests, and whether or not sites of the highest ecological value can successfully be protected are causes of uncertainty.

Climate change also is a significant factor of uncertainty over the long term that may considerably boost forest growth while also exacerbating the risk of forest damage; the proportions of tree species will change, and the conditions for timber harvesting may deteriorate in some areas. Recreational use of forests in the winter will also be adversely affected by the reducing snowfalls in Southern Finland. All climate change impacts on forests and greenhouse gas emissions from forests and soil are not known at present.

International policies are another factor that influences the operating environment. While the possibilities of influencing competitiveness by national policies are limited, an effort may, however, be made to create preconditions for competitiveness and the renewal of the sector. Many of the objectives and projects proposed in the strategy depend on central government funding for their implementation, and they thus compete with other initiatives that require political funding. A key factor of uncertainty in terms of the National Forest Strategy is associated with the desired state that prevails among political decision-makers.

7.4 Project portfolio

The project portfolio seeks to create better preconditions for growing welfare produced by forest-based business and activities and to safeguard economic, social and ecological sustainability. This objective crystallises the mission of the entire National Forest Strategy, and it can thus be considered a higher level objective of the strategy. In the following section, the impacts of the projects contained in the portfolio are assessed by examining them in proportion to the aforementioned higher-level objective. Where possible, the assessment also draws attention to the project's cost-effectiveness and risk levels.

However, the descriptions of the projects in the portfolio currently are too abstract to permit their quantitative assessment. For example, no information is provided on the costs of the projects, preventing any assessment of their cost-effectiveness. For these reasons, it was necessary to confine the assessment to qualitative aspects.

The following Table contains a summary of the portfolio projects reflected against the objectives and targets presented in the National Forest Strategy. The Table naturally is open to interpretations, as in addition to direct impacts, many projects will have indirect impacts on a number of other objectives, for example, by creating preconditions for their achievement. However, the Table gives a rough idea of where the strategic projects are placed in proportion to the National Forest Strategy objectives.

TABLE. Projects and their links to Forest Strategy objectives and targets

Objectives and targets	Projects										
	A	B	C	D	E	F	G	H	I	J	K
31. Finland is a competitive operating environment for forest-based business.											
3.1.1 Forest-based business and activities grow, companies in the sector renew and new and growing companies develop.											
• Political decisions and new legislation improve the conditions for renewal and growth for enterprises and business in the forest sector.	X		X								
• Value added grows and resources are used efficiently.	X	X	X					X			X
• Production of domestic wood-based energy increases.	X	X	X	X							
• Growth in diverse forest-based service business and the natural product sector.	X		X				X	X		X	X
3.1.2 Supply of raw materials allows for increased use of forests and new investments											
• Forest resources are abundant and healthy with good growth potential and respond to the growing needs of bioeconomy.				X				X			X
• Wood and forest service markets are balanced and competitive.	X		X	X							
• Service capacity, efficiency and functioning of transport routes and communications are improved.							X				
3.1.3 EU and international forest policy promote sustainable use, acceptability and competitiveness of forests and wood	X										
• International agreements and work in various organisations promote sustainable forest management and bioeconomy.											
• EU Forest Strategy and forest-related initiatives reinforce business activities in the forest-based sector and secure the conditions for and acceptability of the sustainable use of forests and wood.											
• EU and international energy and climate policy reflect the real climate benefits of forests, sustainable forest management and wood-based products and wood-based fuels continue to be counted as zero-emission renewable energy sources in energy production.											
• Bilateral forest cooperation supports commercial activity and investments as well as export of Finnish know-how on natural resources, and development cooperation in forest sector contributes to poverty reduction, good governance of forests and fair and just distribution of the benefits .											
3.2. Forest-based business and activities and their structures are renewed and diversified											
3.2.1 Know-how on forest-based business and activities is diverse and responds to changing needs											
• R&D activities by means of public funding supports, in particular, development of business in forest bioeconomy, commercialisation of products and services, demonstration projects and anticipating changes on the markets and other operating environment.			X			X				X	
• Cooperation between education and training and working life is reinforced.								X			
• Number of those completing education at different levels corresponds to needs relating to recruitment and know-how in the field.								X			
• Research strategy in the forest-based business and activities steers research in line with the needs of the field.						X					
• The competence of the staff is up-to-date and occupational welfare improves.	X					X		X			
3.2.2 Administration is flexible, effective and customer-oriented											
• Administration, its cooperation and services support the competitiveness of the field and respond to customer needs.	X		X								
• Forest-related information and statistics are open, comprehensive and up-to-date, which supports their broad utilisation.	X	X	X								
• Permit procedures in the environmental administration are quick and flexible and they support the implementation of investment projects and maintain a high standard of environmental protection.		X									
• Planning and zoning support the opportunities for forestry and diverse business.		X									
3.3. Forests are in active, economically, ecologically and socially sustainable and diverse use											
3.3.1 Forestry is active and business-like											
• Active and business-like forestry increase, the size of holdings grows and forest ownership structure supports active utilisation of forests.	X			X							
• Incentive schemes for forestry are effective and activate forest owners.	X				X						
• Opportunities of forest owners to engage in gainful activities increase through commercialisation of ecosystem services.			X		X		X			X	
3.3.2 Forest biodiversity and ecological and social sustainability are reinforced											
• Impoverishment of forest biodiversity is halted by 2020 and a favourable status of forest biodiversity has been secured by 2050.	X				X				X		
• Damages to water systems caused by forestry have been minimised by using best available practices.					X				X		
• Increasingly diverse sustainable forest management supports climate change mitigation and adaptation.	X			X	X				X	X	X
• Recreational use and health-promoting impacts of forests increase and forests are accessible to all.	X				X		X			X	X
• Appreciation of the use of forests and the forest environment is reinforced.	X				X			X	X		X

PROJECTS:
A. Forest-related information and e-services of the future
B. Land use, planning and zoning in support of the forest-based business and activities
C. Statistics on the renewing forest-based business and activities
D. Development of active forest management, entry of timber to the market and forest ownership structure
E. New incentive schemes and resource-efficient forest management
F. Research strategy for the forest-based business and activities
G. Transport infrastructure in support of the forest-based business and activities
H. New cooperation models between working life and training and education
I. Nature management in commercial forests
J. Securing ecosystem services other than wood production and developing their markets
K. Appreciation of Finnish Forests

First and foremost, the Table shows that project A (Forest-related information and e-services of the future) clearly has a greater significance in the National Forest Strategy than others, as it has links to so many strategic objectives. For the same reason, project C (Statistics on the renewing forest-based business and activities) must be highlighted as having multiple impacts compared to other projects. Project F, Research strategy for the forest-based business and activities, will naturally also have an impact on many objectives, depending on the more detailed contents of the strategy.

The Table also shows that while the impact of international policy matters on forest sector issues is clearly increasing, the project portfolio contains no projects relating to international forest policy.

A more detailed assessment of each individual project is provided below.

7.4.1 Assessment of strategic projects

Strategic project A. Forest-related information and e-services of the future. 2015–2020.

The project will develop a next-generation forest-related information system and a process for keeping the information resources up to date. The Metsään.fi web service will be developed as an open portal for information and e-services that will support forestry entrepreneurship, cost-effective operation and growth of the forest service market while helping to keep forest-related information up to date. It will be a pioneering service in Europe for managing forest use and for the utilisation of geographical information in safeguarding biodiversity, cultural heritage and ecosystem services.

Impact assessment

A good knowledge base will not only serve as an instrument of decision-making but will also help to identify new forest-based opportunities and develop new business. The competitiveness of the sector and companies operating in it as well as the generation of new service and other business are linked with the application, production and open accessibility of new information.

Changes in the global operating environment, EU legislation, and implementation of domestic policies will increase the need for information and advice. As forest use diversifies and forest ownership structures change, the number of new actors operating in the field will grow. This trend will highlight the need for an electronic service portal. The benefits of an electronic information system are associated with the supply of raw materials, development of various new forest-based services and enterprises, safeguarding of biodiversity and recognition of cultural values to mention a few.
Investing in information systems and information flows would be a natural role for the government where this investment increases the volume of information available in the market or corrects its asymmetrical distribution among the actors. If successful, this project will meet both objectives. In the big picture of financial support allocated by the central government to the forest sector, this project represents a relatively minor input, and the total risk level of the project is reasonable.

Other remarks

- Plenty of information is available in various sources, and organising the information, designing a customer-oriented format for the systems, and building an easy-to-use and effective user interface will thus be critical factors.
- Attention should be paid to the extent to which data collection currently mainly carried out on public funds could be privatised.

Strategic project B. Land use, planning and zoning in support of the forest-based business and activities. 2015–2016.

Clarifying the interfaces between the Forest Act and the Land Use and Building Act to eliminate overlaps in steering. Clarifying the procedures concerning permits for landscape work and planning regulations Access to planning regulations in form of geographical information will also be organised.

Impact assessment

In recent years, forests have increasingly been reserved for uses other than wood production, and more restrictions that apply to forest use have been set on forestry areas in regional land use plans and local master plans. Eliminating overlapping steering by public authorities and simplification of permit procedures are valuable objectives, especially from the perspective of administration and resource use efficiency. Developing the planning system will create possibilities of generating more enterprising activities based on forestry and forests in the target area of the plan.

When preparing local master plans, the impacts on and costs incurred by forest management and timber purchasing actors are not usually taken into account, even if these may locally be significant. A study produced by the Natural Resource Institute Finland and financed by the Finnish Forest Foundation indicates that zoning designations in a local master plan may reduce total harvesting volumes and stumpage earnings by anything from a few per cent to over twenty per cent, depending on aspects emphasised by various municipalities and the landowners' and timber buyers' reactions to the designations and requirements of obtaining permits for landscape work. In particular, local

master plans have an impact on forestry in the vicinity of cities, urban areas and sites reserved for recreational use and with ecological values. In a study conducted in the area of the Forest Owners' Association in Southern Finland (32 municipalities), while designations in a local master plan only slightly increased the surface of protected areas, they clearly increased the area of forest and poorly productive forest land designated for limited timber production to 5.5%. The restrictions mainly concerned regeneration fellings.

Other remarks

- It might be necessary to evaluate the current status of planning and zoning, as municipalities may emphasise different aspects in their local master plans, and they appear to have varying ideas of what kind of steering local master planning should achieve.
- It should be investigated if any other needs are associated with planning development than ensuring that the impacts of plans on forestry are assessed and that expertise in forest-based business and activities can be brought to bear on the planning process. For example, will the production of renewable energy (groundwater areas) and, for example, wind farms bring additional needs?
- Should plan designations be incorporated as geographical information in some system where actors in forest-based business and activities would have easy access to them?
- Forest planning, where a new Forest Act would give access to a larger selection of means for coordinating various modes of forest use, would be an alternative to land use planning and administration under the Land Use and Building Act regarding forests.

Strategic project C. Statistics on the renewing forest-based business and activities. 2015–2017.

Collection of statistics on the interfaces between the forest, energy and chemical industries, nature tourism, forestry-related services and other forest-based business and ecosystem services will be improved.

Impact assessment

As wood and forest uses diversify, new uses and users will emerge in different sectors, and it thus also is necessary to improve the collection of statistics on them. The current statistics give too narrow a picture of the significance of forest-based business and activities. Sectoral boundaries are blurring, and an increasing number of sectors must be considered in political decision-making. The production of bioenergy and biochemicals based on forests and wood will grow, pulp derivatives will increasingly be used in other sectors, and wood products and wood composites will be developed for the use of such sectors as the construction industry. A high value added will be stressed in the production, and value can also be derived from services associated with the products. While tourism, recreation and health-related services based on forests are growing sectors, there are gaps in the statistics on ecosystem services other than wood production. In particular, nature tourism is a sector that could bring greater economic and social benefits and impacts in the future, especially to regional economies.

Similarly to information system development, maintenance and development of statistics are natural forms of involvement for the public sector. The creation of new forms of statistics requires in-depth special expertise, however, and the risk is that permanent new statistics cannot be achieved at a low cost, which is a clear disadvantage considering the stricter budget discipline in the public sector.

Other remarks

- Developing the collection of statistics on services is particularly challenging.
- The monitoring of bioeconomy development will bring further needs of keeping statistics related to forest-based business and activities.

Strategic project D. Development of active forest management, entry of timber to the market and forest ownership structure. 2015–2017.

Underpinned by studies, forestry taxation and legislation will be developed to support active forest management, entry of timber to the market and a change in the forest ownership structure. Increasing property sizes and halting fragmentation will be promoted, among other things by developing legislation on joint forest ownership and new forms of forest ownership and by reducing the number of properties owned by an estate.

Impact assessment

A high level of activity in forest management and entry of timber to market should be safeguarded when aiming for additional use of wood, both for energy production and for the needs of new forestry investments. The steering methods concerning ownership structures and the timber market must have a long time span to ensure predictability in the market.

Larger property sizes and the ensuing economies of scale will doubtlessly increase efficiency and profitability in forestry. The policies must aim for removing any administrative obstacles to forming larger forest properties. According to some reports, a rejuvenation of the body of forest owners would result in more active forest management.

The current practices of forest taxation, or taxation of capital income based on earnings from selling timber, should be assessed in the light of their neutrality and horizontal justice. If forest

taxation is neutral in the sense that it does not influence forest owners' behaviour, the functioning of the timber market or the utilisation of different modes of forest use, there are no grounds in terms of the national economy to develop forest taxation, for example, in a direction that would favour the selling of timber or various modes of forest use. However, forest economy research has pinpointed features in the current forest taxation regime that may affect its neutrality, as they could discourage the entry of timber into market. This would justify an adjustment of the forest taxation system that would make it more neutral.

The current tax regime does not recognize a forest owner who engages in business-like forest management and the associated industries as it does, for example, recognize a farmer or a sole trader. Routinely putting forest taxation into the sphere of company taxation would not, however, automatically remove the non-neutral aspects of forest taxation regarding the supply of timber by forest owners who derive intangible benefits from their forests. A change could also contain many risk factors for forest owners who have adapted to the current system. These risks could expose the system to inefficiencies and speculative behaviour in the timber market, at least over the short and medium term.

Other remarks

- It would perhaps be inadvisable to support by public policy a transition to operating models that need to be economically profitable for private individuals. For example, tax incentives could give rise to inefficient practices in joint forest ownership, whereas the goal should be at ensuring neutral competition between different forms of ownership.
- Measures need to be taken and additional research conducted related to the themes of this project.

Strategic project E. New incentive schemes and resource-efficient forest management. 2016–2020.

The project will prepare a future incentive scheme for forest management that promotes active and resource-efficient forest use and welfare derived from non-market benefits.

Impact assessment

The project will examine incentives for forest management: State aid (the current financing system for sustainable forestry, Kemera), taxation and guidance by information in order to encourage more active forest use with the aim of producing a new type of an incentive scheme for the 2020s. The incentive scheme would promote timely seedling stand management, the use of improved nursery stock and looking after forest health. In particular, it would also safeguard the production of non-market benefits, including environmental benefits. Additionally, development projects and innovations are to be prioritised in aid allocation.

The expanding needs of forest use are associated with not only wood processing and timber production but also services based on forests. Many of these are so-called public goods, including the landscape, carbon sequestration, water and biodiversity, which do not have a market price but which may offer significant opportunities for business and livelihoods in the future. Some of these are already being exploited today, for example, in the form of agritourism enterprising, by forest owners themselves or by various tourism entrepreneurs, especially through activities pursued on state land.

The project aims for a major reform in the legislation on financing for sustainable forestry. While the current act, which has as yet not been adopted, contains certain steps forward, no sea change compared to the current aid system is in sight. A change of direction in the aid scheme from supporting timber production to supporting public goods obtained from the forests would be a major reform in forest-based business and activities. According to the environmental economics theory, this would be a step in the right direction.

Other remarks

- The project has links with project J, in which fragmented information on different ecosystem services and their value will be compiled. This information base will be needed when considering incentives.

Strategic project F. Research strategy for the forest-based business and activities. 2015.

A research strategy will be prepared and implemented for forest-based business and activities, setting out the priority areas of fundamental and applied research in the sector. As part of research strategy implementation, a technology programme for forest-based business and activities will be implemented to improve the productivity of work carried out in the forests and to promote forestry-related service production.

Impact assessment

As forest-based business and activities diversify and become renewed and we are making our way towards bioeconomy, it is vital that research will be directed by the changing needs. Research inputs will be needed to generate new innovations that produce value added and new enterprising and services based on forest use. Introduction of the advancing information technology, automation and robotisation in forest-based business and activities, also in small companies, will be a factor of our future competitiveness. In order to set the course for research related to forest-based business and activities, it will be strictly necessary to anticipate changes in the operating environment and their impacts. A high standard of fundamental and applied

research will lay the foundation for promoting the entire sector and forest use.

For the purposes of preparing a research strategy, key areas of research should be identified, and greater inputs should be targeted at these areas than at other. On the other hand, this also poses a risk, as the future always holds uncertainties. Non-earmarked research funding should also be available to enable research on interfaces of disciplines and even "mad" science. In order to create an overall picture of research needs related to forests, it would be useful to compile a list of research needs associated with forest-based business and activities in other strategies, including the bioeconomy strategy.

The research strategy for forest-based business and activities can support the continuation of multi-disciplinary research that is vital for the sector and promote a high scientific standard, improving its position in competition for both domestic and international research funding. Finding financing for research related to forest-based business and activities by tapping the strategic funding of the Academy of Finland should be one of the objectives. When preparing the research strategy for forest-based business and activities, relying on academic research expertise of the highest standard would be vital, ensuring that the project has adequate expertise in scientific methodology.

Other remarks

- A precondition for exploiting the new opportunities brought about by bioeconomy is finding new ways of operating and new business skills, for which relevant research is required.
- The research strategy should also include a financing plan. In the future, an increasing share of research in forest-based business and activities, too, will be based on funding subject to competition. In other words, it will be necessary to take a stand on whether the aim should be at creating a new financing instrument in order to implement the research strategy for forest-based business and activities.

Strategic project G. Transport infrastructure in support of the forest-based business and activities. 2015–2020

A development programme for directing public investments to road networks, railway lines and terminals that specifically serve forest-based business and activities will be prepared and implemented.

Impact assessment

Maintaining the basic transport network is a key precondition for the supply of wood raw material and safeguarding the competitiveness of companies and active and diverse forest use. Transport routes are also vital for the use of ecosystem services other than wood production. Adequate maintenance of the transport network is one of the preconditions for recreational use based on forests and the forest environment, nature tourism and generation of new service business. In the future, smooth flows of wood raw material, wood used for energy, materials and by-products will necessitate not only electronic networks between the various actors but also effective transport networks.

This project concerns important investments. The project has obvious links with project E, which also deals with aid to forest-based business and activities. A centralised examination of aid allocated to forest-based business and activities in proportion to the benefits obtained should be completed. In addition, a political level decision must be made on a reasonable balance between public and private financing in transport network maintenance.

Other remarks

- In addition to transport networks that serve forest-based business and activities, electronic information networks are also important.

Strategic project H. New cooperation models between working life and training and education. 2015–2017.

The project will develop cooperation models between actors in forest-based business and activities and education and training organisations. The models will be relevant to the contents and marketing of occupations and education and training leading to them, as well as to developing companies' operations and the associated competence (for example, on-the-job learning, project work, RDI). Quantitative and qualitative anticipation of the education and training needs of forest-based business and activities and, as necessary, qualitative assessments of skills and labour availability will be carried out.

Impact assessment

Changes in the operating environment that have an impact on society and working life will also set new challenges to education and training related to forest-based business and activities. The development of bioeconomy also brings new needs for education and training. By developing cooperation with working life, the skills levels of labour can be maintained and improved, which will have a positive impact on the competitiveness of forest-based business and activities.

The project is important and potentially highly cost-effective. By developing education systems and cooperation models, possibilities for putting together teaching contents of a new type will be created. This will provide preconditions for improving the attraction of forest-based business and activities among

young people. The impacts of education and training will be realised with a delay of several years or even decades. The risk is that the intake numbers and focal areas in the contents of education and training will be misjudged, with over-emphasis on current shortfalls.

Other remarks

- In order to develop the contents of education and training, foresight data on changes in the operating environment of forest-based business and activities and their impacts on the development of occupations in this sector will also be required.
- When planning education and training, information about the trends and significance of new sectors will also be needed, and the project thus has an obvious link with project C that focuses on developing statistics.

Strategic project I. Nature management in commercial forests. 2015–2018.

Nature management in commercial forests will be developed as part of every-day routines with the aim of supporting biodiversity and ecosystem services. The project will also create capabilities and new incentives for more extensive introduction of nature management methods in commercial forests. A forest culture programme will be prepared as part of this project.

Impact assessment

The METSO programme and its measures will play a key role in maintaining forest biodiversity. However, the main part of Finnish forests are available for forestry. Especially in Southern Finland, where the majority of forests are commercial forests in private ownership, integrating nature management in forestry will be essential for safeguarding biodiversity in commercial forests.

In commercial forests, a cross-cutting approach to safeguarding biodiversity in all activities may be the most cost-effective way of ensuring that biodiversity is maintained, as these forests cover such large surface areas. Developing management measures for the forest environment and their practical implementation thus comprises an extremely vital package of projects. A model where forestry specialises in commercial forest management on one hand and nature management on the other should also be investigated, however.

The project could also be included in the technology programme that is part of the research strategy for forest-based business and activities (F), as a precondition for introducing nature management techniques for commercial forests is developing research in this field, and it cannot go ahead without providing more advisory services for both professionals of forestry and forest owners.

Other remarks

- Is a separate forest culture programme really necessary?

Strategic project J. Securing ecosystem services other than wood production and developing their markets. 2015–2018.

The project will promote securing ecosystem services other than wood production and developing their markets. It will collate information on various modes of forest use and their benefits, meanings and values as well as the links between them. Possibilities for and any administrative/legislative obstacles to introducing natural value banks and voluntary contractual operating models for safeguarding biodiversity, water protection, carbon sinks, game husbandry and recreational values of the forests and for market development will also be investigated.

Impact assessment

The growing needs of forest use are associated with not only wood processing and timber production but also increasingly with forest-based services, including nature tourism, wilderness tourism, experience tourism and recreational use. Many of these services are so-called public goods, including landscapes, carbon sequestration, water, biodiversity and other natural values which have no market price but which may offer significant opportunities for earning a livelihood in the future.

The project will also be significant for the future bioeconomy, and it should be linked with research as early as possible. In this sense, it also has close links with the project aiming to develop a research strategy for forest-based business and activities (F) and could be part of it. The project also has interfaces with the project relevant to nature management in commercial forests (I) and the project aiming to develop new incentive schemes and resource-efficient forest management (E).

Other remarks

- The project also has links with project E New incentive schemes and resource-efficient forest management, as the incentive scheme should in particular safeguard the production of non-market benefits, including environmental benefits. In project E, information is required on the various modes of forest use and the most important ecosystem services to be safeguarded, which this project sets out to collect.

Strategic project K. Appreciation of Finnish forests. 2015–2018.

The project will create preconditions for boosting the appreciation of forest use and forest nature. Particular attention will be focused on strengthening the children and young people's relationship with the forest and promoting the acceptability of sustainable forest management and use. Measurement of and indicators for appreciation felt for forests will also be developed as part of this project.

Impact assessment

The financial significance of forest-based business and activities in Europe is very small in most European countries, and forest use thus meets with opposition. This is reflected as conflicts, for example, in the drafting of EU policies. The project is based on concern over increasing opposition to forest use in Finland, and the lack of appreciation of forest-based business and activities among the general public. As the population becomes more urban, the citizens lose touch with nature and forests, which may undermine the appreciation felt for them. On the other hand, threats such as those brought about by climate change are increasing environmental awareness. It is likely that the value and appreciation of forests in Finnish society will in the future be influenced above all by the type of relationship with the forest that young people develop. As young people lose touch with nature, a personal relationship with the forests may be a thing of the past in years to come.

In the bioeconomy of the future, forests and their diverse use will be a key source of welfare in Finland, and citizens who appreciate forests and accept their use will be essential. Research methods should thus be applied to monitoring the trends in appreciation of forest-based business and activities and forests among young people and also other groups of citizens.

Other remarks

- Long-term cooperation with schools and youth organisations in which the potential of forest-based business and activities are presented will be important (cf. the Forest Talks campaign).

7.5 Other comments

The Parliament's position on the Government Report on Forest Policy 2050, on which the National Forest Strategy 2025 (NFS 2025) is based, highlights expertise, increasing the use of wood to mitigate the harmful effects of climate change, sustainability and acceptability of forest management and use, active entrepreneurship, for example, by facilitating generation changes and preventing the fragmentation of forest properties, creating preconditions for new investments and strengthening multidisciplinary research that supports the renewal of forest-based business and activities. The position also stresses exerting influence on the preparation of EU and international environmental policies. These themes are extensively covered by the objectives and goals of the National Forest Strategy.

The National Forest Strategy also highlights forest ecosystem services and promoting their exploitation, underlining intangible products, services and public goods produced by the forests whose economic, ecological and social importance is likely to grow in the future. The intangible ecosystem services of the forests are also examined from different perspectives in most of the strategic projects.
The strategic projects (measures) of the project portfolio cover the strategy objectives and goals in a reasonably balanced manner, excluding international forest policy. In this respect, the strategy notes that EU and international forest policy will be managed by the administration.

Monitoring of the achievement of National Forest Strategy objectives will be based on indicators. Some of the indicators, including those measuring trends in forest industry turnover, are subject to the influence of international markets and economic trends as well as the demand for end products. A lack of statistics concerning some of the indicators and/or challenges associated with their quantitative measurement present problems. For example, this concerns ecosystem services other than wood production. Project J will examine the significance of ecosystem services to the national economy and develop indicators for them. These indicators should be evaluated and developed in the context of strategy implementation.

The portfolio comprises 11 projects, some of which are large and some smaller. Considering their nature as strategic projects, their number in the portfolio is rather large. Additionally, all these projects except one are to be launched in 2015, which will increase the workload of the public officials responsible for strategy implementation and is likely to require the participation of a sizeable number of people in the projects' steering groups. Especially for the ministry responsible for the strategy (Ministry of Agriculture and Forestry), the implementation of such a heavy project portfolio may prove challenging. Some of the projects, especially those that concern legislation, will require long-term preparation, and they should be launched immediately. In the case of others, it might be a good idea to consider if it is worth tying up the resources all at once to such a high number of projects, even if they are all useful as such, or whether the resources should be concentrated and some of the projects delayed slightly. On the other hand, in some thematic areas cooperation with other branches of administration and programmes could enable the completion of even a higher number of projects. Threats to the projects may also include their internal expansion and fragmentation as the various interest groups strive to incorporate in them all the aspects that are important to them.

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Key terms

Forestry	Denotes roundwood production, forest and nature management and wood harvesting.
Forest industry	Denotes mechanical forest industries (sawmill, board and other wood products) and chemical forest industries (pulp, paper and paperboard).
Forest sector	Comprises forestry and forest industry.
Forest cluster	Comprises the forest sector and closely related branches of mechanical engineering and chemical industry, automation and packaging systems operations, printing industries, energy production as well as related research and consultation.
Forest-based business and activities	Processing and services as well as public goods based on both tangible and intangible products. (In connection with education and training, the forest-based business and activities have traditionally mainly denoted ordinary forestry professions. In the classification of study fields other tangible and intangible products and services are included in nature and environmental studies.)
Bioeconomy	Comprises sustainable use of natural resources and use of biological and biotechnological processes in production chains. In bioeconomy natural resources are used in a sustainable manner, by applying and replicating biological processes.
Forest bioeconomy	Denotes bioeconomy based on forests.
Sustainable forest management	Denotes the management and use of forests and forest lands in a way that preserves their diversity, productivity, regenerative capacity and vitality as well as the opportunity to carry out now and in the future significant ecological, economic and social activities on local, national and global levels in a way that does not harm other ecosystems. The term sustainable forest management also includes forest conservation.
Ecosystem approach	Denotes the framework of the Convention on Biological Diversity (CBD) which seeks to attain a holistic view in the sustainable use, management and protection of natural areas. The approach emphasises the preservation of the structure and functioning of ecosystems so as to protect natural functions vital to humanity and nature alike in the future. According to a report of the Ministerial Conference on the Protection of Forests in Europe, in terms of the content, ecosystem approach corresponds to the term sustainable forest management.
Ecosystem services	These are benefits to humans derived from nature. Many ecosystem services are vital to humans and other organisms. Biodiversity is the base of ecosystem services, as it helps nature to adapt and regenerate. Ecosystem services are divided into productive, regulating, cultural and supporting benefits. Examples of productive services include the production of timber, berries, mushrooms and game animals, regulating services include carbon sequestration and maintenance of soil productivity, cultural services include scenery, outdoor activities and recreation, and supporting services include photosynthesis and nutrient cycles). Supporting services are the base for other ecosystem services.

Fact box

Three-fourths of Finland's land area, some 23 million hectares (76%), is covered by forests. In addition, there are over 3 million hectares of forestry lands with few trees such as open peatland and exposed bedrock.

- The annual increment of Finnish forests is 104.4 million cubic metres, and the volume of the growing stock is 2.3 billion cubic metres.
- Annual roundwood harvesting has totalled about 50 million cubic metres.
- The annual carbon sink of the forests is over 30 million tonnes of CO2 equivalent.
- In 2013 the value added of the forest sector was 6.7 billion euros, and is share of the total value added was 3.9%.
- In 2013 the gross stumpage earnings were nearly 2 billion euros, of which the share of sawmilling industry was about 68%.
- In 2013, the forest industry and forestry employed about 65 000 people, of which about 41 000 were employed in forest industry. Indirectly, the forest industry employs about four times as many people in other sectors.
- In Finland there are 49 paper, paperboard and pulp plants, about 130 industrial sawmills and several board and wood product enterprises. In addition there are almost 900 heating and power plants which use forest chips.
- The most important market area of the forest industry is the Europe, accounting for almost 70% of the total exports from Finland.
- Pulp and paper industry products represent 75–80% of the value of exports of forest industry products, while the share of sawn goods and wood products is about 20–25%.

Trend in the value of forest industry production in 2005–2014

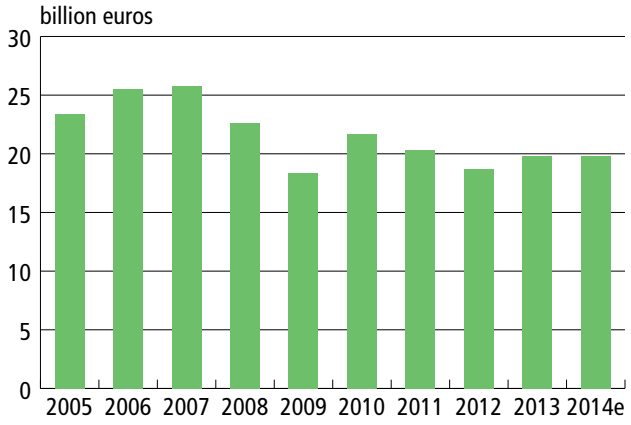


Figure 1. Value of forest industry production in real terms at the price level of 2013, EUR bill. For 2014 an estimate. Source: Statistics Finland.

Trend in the value of forest and wood products exports in 2006––2014

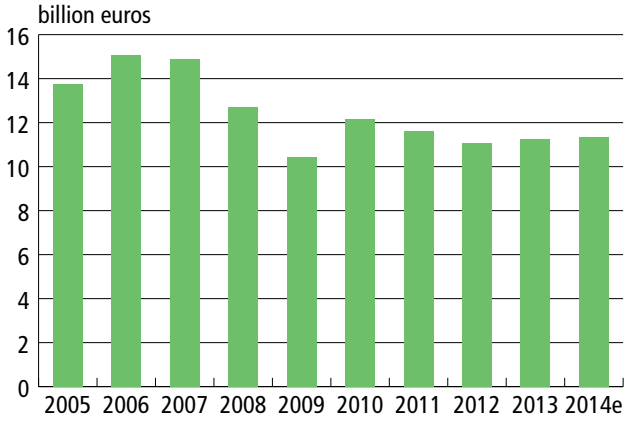


Figure 2. Value of forest industry exports in 2006–2014e in 2012 monetary value (wholesale price index). For 2014 an estimate. Source: Finnish Customs.

Trend in domestic roundwood removals in 2002–2014e

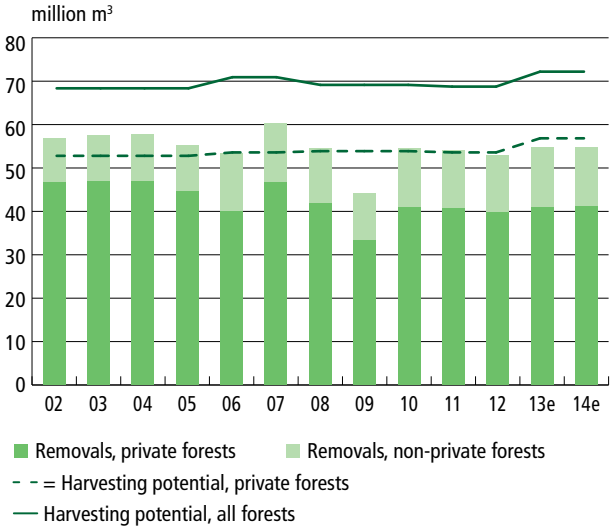


Figure 3. Trend in roundwood removals in 2002–2014e and sustainable harvesting potential. For 2013 and 2014 an estimate. Source: Natural Resources Institute Finland.

Trend in gross stumpage earnings in 2006–2013

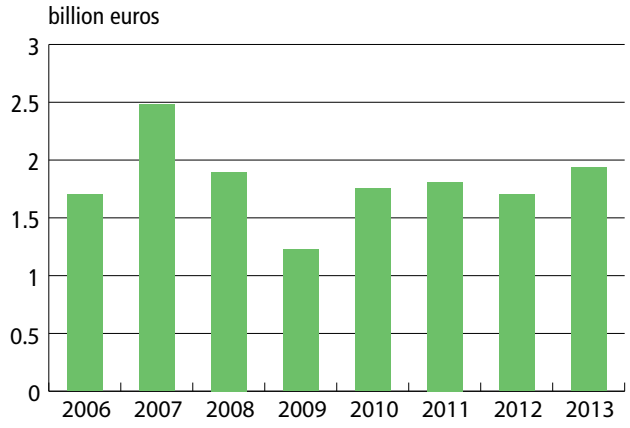
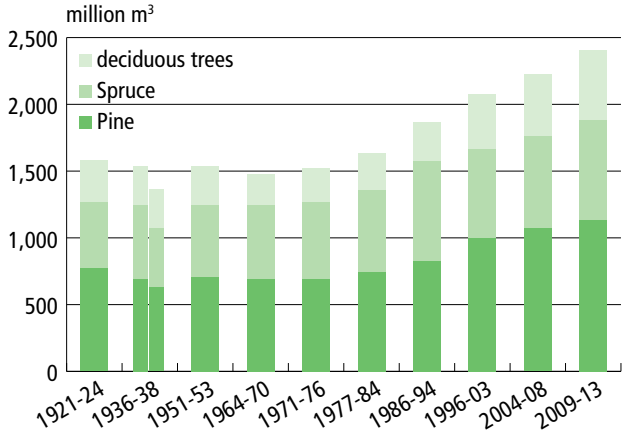


Figure 4. Trend in gross stumpage earnings. Source: Natural Resources Institute Finland.

Trend in growing stock volumes in 1921–2013



In the inventory 1936-1938 the left side of the column indicates the stock volume according to the borders of Finland before certain areas were ceded to the Soviet Union and the right side shows the volume after that.

Figure 5. Growing stock volumes on forest land and poorly productive forest land since the 1920s. Source: Natural Resources Institute Finland.

Trend in annual increment of growing stock and growing stock drain

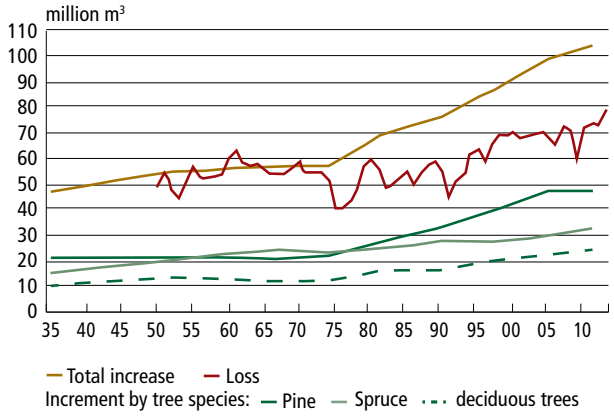


Figure 6. Annual increment of growing stock and growing stock drain in 1935–2013. Source: Natural Resources Institute Finland.

Trend in volume by roundwood assortments on land available for wood production in different total roundwood removal estimates in 2010–2050

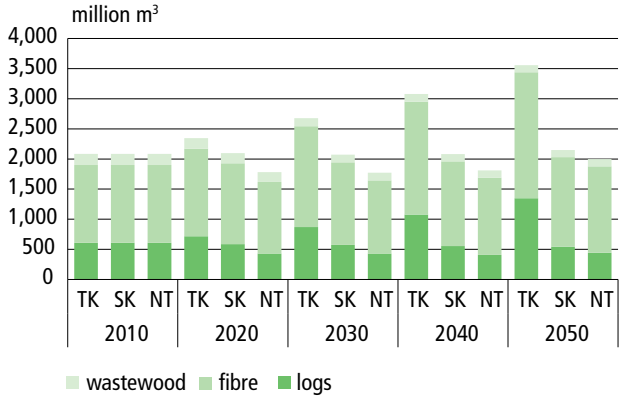
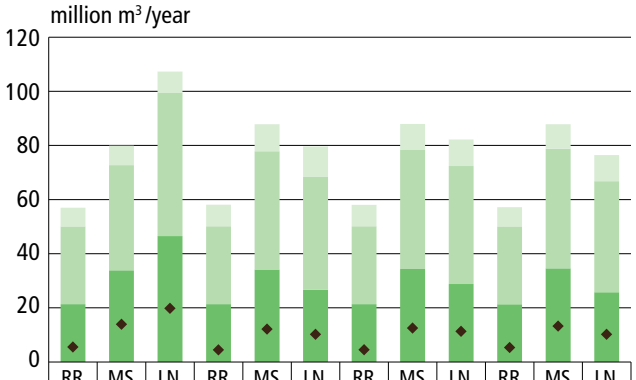


Figure 7. Trend in the growing stock volume in different total roundwood removal estimates. Source: Natural Resources Institute Finland.

Estimated total roundwood removals in 2010–2049 based on different removal calculations



	RR	MS	LN	RR	MS	LN	RR	MS	LN	RR	MS	LN
	2010-2019			2020-2029			2030-2039			2040-2049		
energy stemwood	6,9	7,2	7,7	8,0	10,0	11,1	7,9	9,6	9,8	7,1	9,0	9,7
fibre	28,7	38,9	53,0	28,8	43,7	41,8	28,8	44,0	43,6	28,8	44,2	41,1
logs	21,4	33,9	46,5	21,4	34,2	26,7	21,3	34,4	28,8	21,3	34,6	25,7
branches and stumps	5,5	13,9	19,8	4,4	12,1	10,2	4,5	12,5	11,3	5,3	13,2	10,2

RR=realized total roundwood removals in 2008-2012,
MS=maximum sustainable roundwood removals
LN=largest net income.

Figure 8. Estimated total roundwood removals by roundwood assortments based on different removal calculations. Source: Natural Resources Institute Finland.

Share of wood fuels in total energy consumption in 2000–2014e.

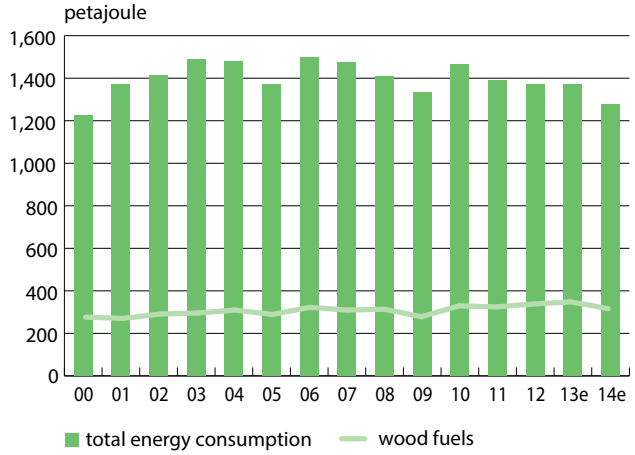


Figure 9. Share of wood fuels in total energy consumption. Preliminary data for 2013 and 2014 are based on energy consumption data for January–June of respective year. Source: Statistics Finland.

Trend in the use of forest chips 2005–2014e

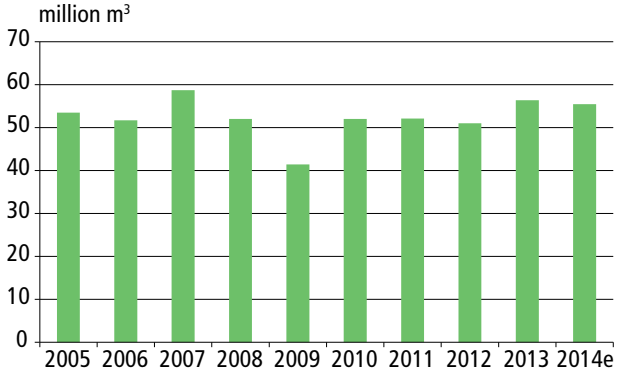


Figure 10. Total use of forest chips in 2000–2014e. The figures include the consumption of forest chips in heating and power plants and small-scale housing. For 20132014 an estimate. Source: Natural Resources Institute Finland.

Trend in carbon sequestration and accumulation in forest ecosystems in 2005–2013

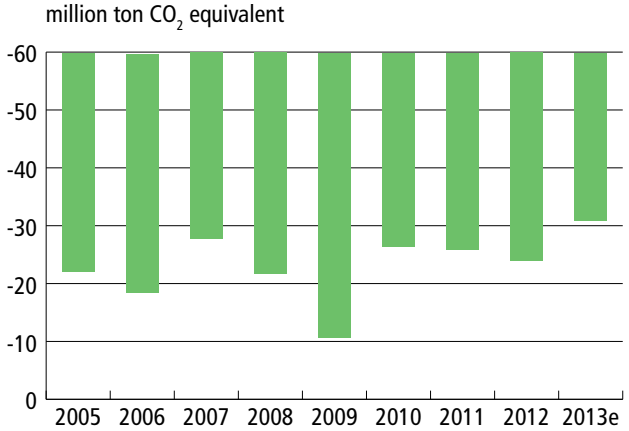


Figure 11. Annual carbon sink of forest stand and soil in 2005–2013e, million tonnes CO2 equivalent. For 2013 an estimate. Source: Natural Resources Institute Finland.

Value of forest-based business, activities and services in 2012, million euros	
Pulp and paper industry, gross value of production (2012)[2]	12,945
Wood product industry, gross value of production (2012)[2]	5,578
Forestry, output at basic price[2]*	4,216
Stumpage money income, gross[2]*	1,950
Nature tourism, estimated value added[1] (2011)	1,226
Energy, garden and environment peat, estimated total turnover (2012)[3]	~ 300
Forest chips + fuelwood, value at the place of use[2]	361
Berries, mushrooms and lichen, trade value + estimate of household use, direct sales and sale in open-air market places (2012)[2]	~ 220
Game husbandry, calculated value[2]	64
Reindeer husbandry, calculated value[2]	15

The value of recreational use of forests by pricing the visits to forests for outdoor recreation has been calculated at about 1.93 billion euros a year.[2]

The figures are not fully comparable with each other and some of them are based on estimates. However, they give some idea of the scale of the values of various forest-based business, activities and services.

Source: 1Statistics Finland, 2 Natural Resource Institute Finland, 3Bioenergy Association of Finland; *preliminary data

Protected forest land and poorly productive forest land and lands in restricted use 31 December 2008						
	Whole country		Southern Finland		Northern Finland	
	1,000 ha	Osuus, %	1.000 ha	Share, %	1,000 ha	Share, %
Land area (forest and poorly productive forest, NFI 10, 2004–2008)	22,820	100.0	11,526	100.00	11,294	100.00
Strictly protected forest (1)	2,048	9.0	262	2.3	1,786	15.8
Protected forests where cautious felling allowed (2a)	133	0.6	59	0.5	73	0.7
Protected forests (1 + 2a)	2,181	9.6	321	2.8	1,859	5.3
Areas in restricted forestry use (2b)	782	3.4	179	1.6	603	5.3
Protected forests and those in restricted forestry use (1 + 2a + 2b)	2,963	13.0	500	4.3	2,462	21.8

In 2011 the national parks of Sipoonkorpi and the Bothnian Sea were established, with a total land area of 3 387 hectares.

Source: Natural Resource Institute Finland

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