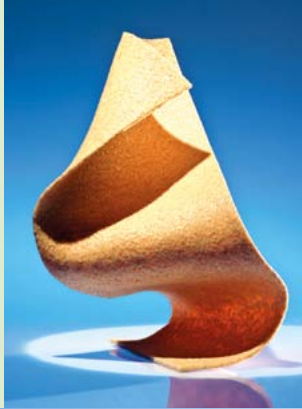


# Government Report on Forest Policy 2050





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# Abstract

Strong strategic outlines are needed to develop the sustainable management of forests in order to allow even more diverse utilisation of Finland's forest resources to enhance the welfare of the Finns. As set out in the Government Programme, the Ministry of Agriculture and Forestry has conducted a participatory process to prepare this Forest Policy Report, which outlines a long-term vision and strategic objectives for the management of forests and the main measures to be taken. Clear and prioritised outlines are needed because the forest-based business and activities in Finland are undergoing the greatest transitions for over a hundred years. As regards forest work the greatest transition took place in the 1960s–1980s, but now changes on the world market, diverse uses of forests and the pressures for changes these give rise to imply significant changes all through the value chain. Forest-based business and activities, utilisation of forests and the welfare derived from these are going to be increasingly diverse, which offers great opportunities for the sector. In this report the forest-based business and activities are understood very broadly: besides forestry and forest industry they also comprise the production, processing and services relating to the other tangible and intangible products of forests and public goods.

The vision of the Forest Policy Report, **Sustainable forest management is a source of growing welfare**, stresses the diverse welfare derived from forests and the fact that the utilisation of forests offers solutions to the needs of the people and society.

In order to make the vision come true and to be able to increase the welfare obtained from forests we have to succeed in various sets of issues to develop the forest-based business and activities. The Forest Policy Report presents three strategic objectives, founded on the vision:

- 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, sustainable and diverse use.

Success in the measures with the most significant impacts is a precondition for the growth in the welfare produced by forest-based business and activities. The report presents thirteen sets of measures to achieve the strategic objectives and, through this, growing welfare. The most important ones are:

- We create the conditions for renewal of enterprises in the field and development of new and growing enterprises through business policy and legislation.
- We create the conditions for business-like and active forestry, for example, by developing taxation and improving the structure of holdings and forest ownership.
- We secure the supply of raw materials in line with the demand and improve the functioning of the markets.
- We target R&D activities by means of public funding to support the renewal of forest-based business and activities and transition to bioeconomy.
- We secure the biodiversity of forest nature, ecosystem services and ecological and social sustainability of forests.

# 1 Introduction

## 1.1 Forest Policy Report outlines the long-term forest policy framework

The Finnish forest sector is undergoing the most significant changes for a hundred years. Globalisation, climate change, rapid development of ICT technologies and changes in the demographic structure are examples of major powers of change which also impact very strongly on all forest-based business and activities. These changes create both threats and opportunities for forest activities in Finland. We need to prepare for future changes, while at the same time utilising forests for today's needs.

The Ministry of Agriculture and Forestry conducted a participatory process to prepare the Forest Policy Report set out in the Government Programme. The report lays down the long-term outlines for the Finnish forest policy. The report presents the shared vision for forest-based business and activities, strategic outlines and the main sets of measures to implement these. The long-term outlines, together with the report of the Finnish Parliament based on these, steer the preparation of the Finnish Forest Strategy 2025 – our next National Forest Programme – during 2014. In the report forest-based business and activities are understood very broadly to comprise, besides forestry and traditional forest industry, all activities that are one way or the other based on forests (see definitions of key terms). Accordingly, the term forest policy is also used in a broad sense. Forest policy has obvious, very close contacts with the Finnish Bioeconomy Strategy and its implementation.

## 1.2 Role of forests in Finland

The Finnish national economy is to an exceptional extent based on value added derived from forests and wood processing.

Wood processing industry is very important for Finland (see Fact box p. 39). In 2013 the value of wood industry production totalled about 19 billion euros. It employs about 42 000 persons directly and the indirect employment effect is even greater. These jobs are very important for the regional economies. Of the Finnish goods exports about 20% are wood industry products, such as various kinds of paper products, pulp, paperboard, sawn goods and products derived from these. In 2012 the value of wood industry exports was about 11 billion euros. The share of wood industry of the net export income is

even greater. In 2012 the stumpage money income to forest owners totalled 1.7 billion euros, of which the share of sawmill industry was about two-thirds.

Of the electricity and heat production in our society a growing share is produced from renewable wood raw material. In 2012 the use of wood fuels totalled 92 TWh, which is 24% of the total energy consumption. Wood fuels became the largest source of energy, passing oil, which used to be the largest. Electricity and heat production in many municipalities is strongly based on forest chips, which are used to substitute for fossil fuels. In 2012 the use of forest chips hit a new record with a level of use that was 11% higher than in 2011. Of the renewable energy in Finland about two-thirds is produced by the forest industry.

Forests are an important source of mental and spiritual welfare as well. Forests are used for berry picking and hunting as well as hiking and other recreation round the year, and forest nature is the foundation for nature-based tourism. In 2012 the value added created by tourism was estimated at 4.43 billion euros. In total about 13.3 billion euros were spent on tourism in Finland in 2012. The share of nature-based tourism is considerable, according to some estimates as high as about a quarter. Tourism is highly important locally and regionally, especially in northern and eastern Finland. National parks have been shown to have very positive impacts on regional economies.

Of the surface area of Finland about 75%, 23 million hectares, is forest, which is the highest share in Europe. Most of the Finnish forests are in private ownership: private forest owners own more than 60% and the state about 26% of Finnish forests.

In the past 50 years the volume of the growing stock has increased by 50%, thanks to good forest management. At present the wood volume of our forests is about 2.3 billion cubic metres, the annual stemwood increment is about 104 million cubic metres and annual commercial fellings vary between 50 and 55 million cubic metres. In addition to this, energy wood is harvested from forests to be used in heating and power plants. In 2012 this use was about 8 million cubic metres. This means that our forest resources keep growing and we could well increase their utilisation rate on a fully sustainable basis. Annual roundwood fellings could be increased by about 15 to 20 million cubic metres and the use of forest chips for energy could even be tripled.

A significant share of living organisms in Finland are directly or indirectly dependent on forests: of the about

45 000 species of living organisms known to be present in Finland live in forest. Forest is the primary habitat for 814 threatened species and 36.2% of all threatened species live in forest. Of the forest species included in the assessment of threatened species the share of threatened forest species was 9%. In Finland 13% of the surface area of forests and scrubland is strictly protected or in restricted forestry use. Besides the protection areas this includes the habitats of special importance specified in the Forest Act. The share of strictly protected forests is 9%, which is internationally very high. As regards the need, however, protection areas are unevenly distributed between the different parts of the country: in southern Finland the share of strictly protected forests of the forest area is just 2.3% while in northern Finland it is 15.8%.

The volume and value of the production of the Finnish forest-based industries has declined over the past 10 years. In real terms the value of forest industry production and exports has decreased especially due to the decrease in the demand for printing paper, but the value of the production and exports of sawmill industry has declined as well. Because of the negative trend in the paper market several paper mills have been closed down in Finland and the value of paper product exports has decreased by 20–30% from the peak years. This trend should be reversed by improving the competitiveness of the sector and renewing its structures in order to create new investments and production.

As a whole, however, there has been no significant decrease in the use of domestic wood despite the closures of processing plants. This is due to the decrease in the use of imported wood and growing use of wood for energy as well as investments in improving the efficiency of the existing production capacity. This is why there has been no similar decline in the production volumes

of forestry as has taken place in the processing industry. Among the main problems is the decrease in the use of logs because of the decreased volumes in the wood product industry.

There are opportunities to produce far more diverse forest-based products and services. What we can expect to see is the fading of the boundaries between the forest sector and other sectors, such as the chemical and energy sectors. Forests are a renewable resource and wood-based products can be used to substitute for various unrenovable products and services. The utilisation of forests is very energy-efficient: almost all parts of a tree can be used, products made of wood can be recycled and in the end they can be used to produce energy.

Traditional forest industry products are still very important, but besides these new wood-based products have emerged, including biofuels and other bio-based chemicals and materials and the growing production of bioenergy. In addition to these, forests offer a variety of opportunities for recreation and ecotourism, which in certain areas are very important for the regional economy. Forests also contain a major share of the biological diversity of our nature, they function as carbon sinks and reservoirs and impact a great deal on the circulation of water and soil conditions.

Our abundant forest resources and know-how in the field make it possible for Finland to continue to make progress as the spearhead country in the use of natural resources and bioeconomy. We can further enhance our welfare in a sustainable way through even more diverse utilisation of forests. Through this we can create economic growth based on sustainable bioeconomy and new jobs and services.





## 2 Strategic outlines set by the Government

We need strong strategic outlines for developing the sustainable management of our forests and for even more diverse utilisation of our forest resources. The Forest Policy Report presents the selected strategic objectives and sets of measures to develop the forest-based business and activities. Forest-based business and activities of the future are closely integrated with other sectors, climate-friendly, sustainable and resource efficient. Finland's forest resources and forest-based business are the foundation of the emerging bioeconomy.

The prioritised objectives and more detailed measures to reach these are set out in the Forest Strategy 2025 to be drawn up in 2014 on the basis of the Forest Policy Report. Finland's Forest Strategy should contain the measures which can be influenced by actions in the public sector and which create a competitive operating environment for business and for securing biodiversity and ecosystem services. The measures are implemented within the State Budget and the approved spending limits.

The long-term outlines of the Forest Policy Report steer the forest strategies covering shorter time periods, which in the future function as our national forest programmes. Forest issues are also addressed in other strategies and programmes, such as the Bioeconomy Strategy, Strategic Programme for the Forest Sector (MSO), Forest Biodiversity Programme for Southern Finland (METSO), Energy and Climate Policy Strategy, National Biodiversity Strategy, and various rural and regional policy strategies and programmes. The Bioenergy Strategy functions as an umbrella for the other actions. Forest policy is also influenced by several international and EU policies. The Forest Policy Report and Forest Strategy bring together and reconcile the outlines for actions concerning forests.

### 2.1 Vision

#### **Sustainable forest management is a source of growing welfare**

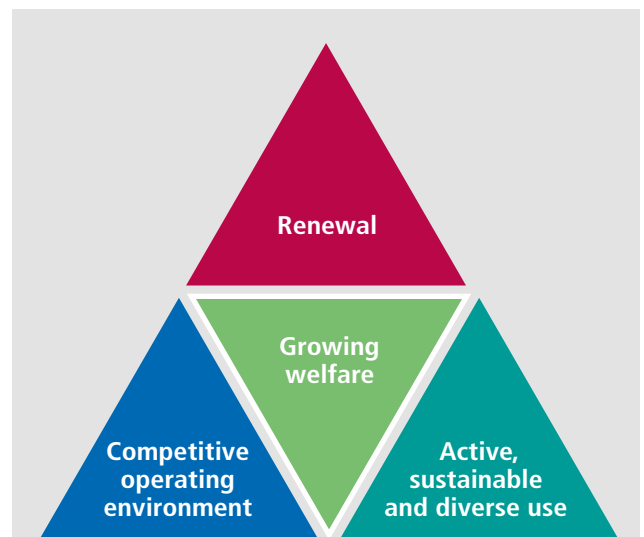
Forests offer solutions for the needs of the people and society. Forest policy creates the conditions for growing forest-based bioeconomy and increasingly diverse welfare. Welfare is composed of numerous factors, including revenue of the national economy, employment,

livelihood, health and recreation, pure and viable environment and biodiversity of forests. Active and innovative utilisation of forests is sustainable and adapts to changes in the operating environment. Changes in the operating environment are taken into account in reconciling the needs of the different uses. Flexible structures support the renewal of forest-based livelihoods.

Benefits: economic growth, added value, customer orientation, renewability, creating new jobs, growth of bioeconomy and diverse ecosystem services and their utilisation, maintaining biodiversity, resource efficiency, increased use of forests for recreation.

**Based on the vision the strategic objectives are (Figure 1):**

- 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, sustainable and diverse use.**



**Figure 1.** The vision and strategic objectives of the Forest Policy Report form a triangle where the core is the growing welfare aimed for in the vision and the apices are the inter-linked strategic objectives.

The strategic objectives of the report form an entity where the growing welfare set as the target is viewed from three mutually complementary perspectives so that implementing these allows to increase welfare in diverse ways. Finland is society which produces forest-based high value-added products and services for exports and domestic consumption and which also sees to the sustainability aspects of 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. The content of the strategic objectives and sets of measures needed to reach the objectives are presented below. **Some of the concrete measures to be taken in the near future are also presented.** Because of the long perspective of the report, up until the year 2050, it is also important to follow and anticipate the trends in the operating environment, adjust the weight on the measures and develop new actions in a flexible way based on the needs that may arise.

## 2.2 Strategic objectives

### 1. Finland is a competitive environment for forest-based business

Through our policy we promote innovation, enterprise, new investments, growth of business and activities and creation of new jobs relating to forests, forest ownership and use of wood raw material. The national forest policy and EU and international policies to promote sustainable forest management support diverse and sustainable management and use of forests and wood raw material.

Benefits: economic growth, added value, resource efficiency.

To reach the strategic objectives we need to succeed in the following issues:

#### **We create the conditions for the renewal of enterprises in the field and development of new and growing enterprises through business policy and legislation.**

- Policy solutions support the competitiveness and growth potential of enterprises in forest-related fields and commercialisation of products and services.
- We promote enterprise based on diverse use of forests and remove legislative obstacles to this.
- We develop business subsidies in a way that the development and commercialisation of biomaterials and bio-based fuels is speeded up by targeting public funding to pilot and demonstration plants. The environment payment scheme activates growth projects of enterprises in forest-related fields.
- We develop the planning system to support the opportunities in forestry and diverse enterprise.

- We utilise the proximity to Russia as a vast market area and source of raw materials and capital even more efficiently than before.
- We support the internationalisation of SMEs within the framework of the Team Finland strategy.

#### **We secure the supply of raw materials in line with the demand and improve the functioning of the markets.**

- We secure abundant, healthy and well-growing forest resources.
- We develop a balanced and competitive wood and forest service market and, through this, activate forest owners and wood markets.
- We improve the entry of wood to the market, thus creating the conditions for investments that increase the use of wood.

#### **We improve our competitiveness through logistics solutions which promote the use of wood and forests.**

- We improve the service capacity of transport routes – roads, railroads and waterways – to improve the efficiency of livelihoods based on wood raw material and forests.
- We develop the efficiency and functioning of data communication routes.

#### **We create the conditions for competitive and sustainable use of wood and forests by influencing and taking the initiative in the EU forest issues and international forest policy.**

- In the EU forest issues we promote bioeconomy and enterprise in forest-related fields in the preparation of and decisions on forest issues in the EU.
- We contribute worldwide to increasing the sustainable forest management, mitigating forest loss and climate change mitigation and adaptation.
- Within the trade policy framework we promote the liberalisation of trade in environmental products and services, aim to remove trade barriers and promote the harmonisation and recognition of technical standards. We take the market access and import needs of the products of food-based business and activities into account in bilateral and multilateral trade agreements.
- We support commercial activities and investments as well as export of Finnish forest know-how through bilateral cooperation.

### **We promote the use of wood-based energy.**

- We increase the use of wood in energy production and as raw material of biofuels through long-term energy policy, thus substituting for fossil fuels, promoting climate policy objectives and improving security of supply.

### **We promote the growth of tourism and various other service businesses relating to forests and the natural products sector.**

- We support the commercialisation of intangible and tangible ecosystem services across the sectors.
- We develop the preconditions for sustainable tourism and support product development in enterprises, taking advantage of, for example, the opportunities offered by national parks and hiking and camping areas.

### **We must make sure that the most suitable young people can be attracted to the sector and that the most important competitive advantage, human labour, feels good at work, and has the capacity for renewal and competence development in a way required by the operating environment.**

Transition to bioeconomy calls for changes in the old structures. There are new business opportunities based on the demand on the market, values of the consumers and sustainable operating practices. The use of biomass is optimal when more value added is obtained from less raw material. We are moving from raw material based operations to market-oriented activities. In developing business in bioeconomy there are excellent opportunities for the growing, competence-oriented SMEs.

Know-how on forest-based business and activities, the strong forest cluster, supply of wood and competitive energy, functioning infrastructure and advanced technology are among the core competition factors in the field. These competition factors need to be secured in the future as well. The competitiveness of forest-based business and activities can be promoted by improving the service capacity of transport routes and terminals and securing the supply of raw material and skilled labour. These also create conditions for new investments and increasing the use of domestic wood. On the other hand, a condition for active forestry and maintaining the raw material base is that there is demand for the raw material. Efficient and functioning communications are a basic condition for all activities and they also promote the development of services. We must make sure that the most suitable young people can be attracted to

the sector and that the most important competitive advantage, human labour, feels good at work, and has the capacity for renewal and competence development in a way required by the operating environment. This can be ensured by seeing to occupational health and wellbeing at work and by fulfilling the social obligations of organisations and actors. Finland's geographical location near Russia is a competition factors which should be utilised even better than at present. Competitiveness is also enhanced by resource-efficient activity.

Services of the forest-based business and activities can be divided into services relating to wood processing products, those relating to forestry, and those relating to forests. There is significant growth potential in these services.

Economic growth and maintaining the competitiveness of the field also call for new investments and business operation models as well as customer-oriented new products and services as part of the development of the forest, wood product, energy and chemical industries. This in turn requires balanced activities on the raw material and energy markets. The current under-utilisation of natural products, game and reindeer in, for example, the production of local foods, cosmetics and medicines call for innovation, internationalisation, more advanced technologies and developing entrepreneurship in the nature sectors. Business opportunities vary by region, which is why regional differences and strengths must be taken into account.

International and EU agreements lay down the obligation to increase the use of renewable energy, which is why the use of wood should be increased through systematic energy policy. By creating the conditions for investments in wood processing we also increase the use of wood for the production of renewable energy. Finland has excellent opportunities for resource-efficient distributed energy production based on renewable natural resources. It has been estimated that, in order to succeed in climate change mitigation, energy production should be basically emissions-free, i.e. carbon-neutral, by 2050. Greenhouse gas emissions can be reduced by improving energy efficiency and substituting renewable energy for fossil fuels. The carbon footprint of wood products is small and they function as long-term reservoirs for carbon.

There are also abundant opportunities in forest-based tourism. Finland's attraction as a destination for tourism is largely based on the nature and, in particular, forests and clean waters. Ecotourism is the most rapidly growing tourism sector. The utilisation of national parks for

tourism requires that they are well managed and have the necessary services. Many of the positive impacts of the natural environment on human health and wellbeing have already been recognised, and these should be utilised to create new nature-based services and wellness business.

Land use planning and zoning should be developed so that it supports the diverse use of forests for business. The delays in the permit procedures in land use planning slow down investments and thus postpone the creation of new production. This also creates uncertainty and makes Finland less attractive as a destination for investments. Planning and zoning should be developed starting from the total benefit, also taking account of the requirements concerning the increased use of renewable energy. Planning should not restrict the practising of forestry in areas where there is no particular cause to reconcile the management and use of forests between the needs of forestry and other livelihoods or special needs of the society. In the Sami homeland the traditional livelihoods of the Sami people are also taken into account in land use and regional planning and the planning of forestry operations and setting targets for this.

Forest-based growth must also be ecologically and socially sustainable because it is the acceptability of the activity that lays the foundation for the demand for products and services. Sustainable forest management must be not only acceptable but also something to be set as the objective. Social sustainability comprises, among other things, seeing to employment, occupational health and welfare and competence development and diverse use of forests for recreation. In addition, the policy must be predictable, have a long-term perspective and encourage to realising the forest-based benefits in various kinds of products and diverse services.

Besides the national policy, in the future forest management and its acceptability will to a growing extent be influenced by the EU and international policies. Because the EU has no common forest policy with related EU legislation, the international environmental legislation and regulation under it are the main factors influencing the forest-based business and activities. However, forest-based business and activities are also to a great extent influenced by the EU agricultural, rural development, energy and climate policies as well as trade, economic and fiscal, employment, industrial, regional and competition policies. Sustainable use of raw materials and promoting the utilisation forests must be set as the objective in the EU and international policy as well. For forest-based business and activities in Finland and to

ensure diverse use of forests it is highly important that in the future even stronger and target-oriented inputs are devoted to initiative, coordination, consistency and comprehensive influence in international forest and environmental policy and in the preparation of forest issues in the EU. Proactive influence is an absolute necessity already at the preparation stage of international processes. Export opportunities should also be utilised within the framework of the EU competition policy.

## **2. Forest-based business and activities and their structures are renewed and diversified**

Forest policy supports the renewal of the field and its structure. The operating practices are agile, activities cross sectoral borders and multi-sectoral enterprise becomes increasingly common. Flexible targeting of research and product development supports the renewal of activities. The structure of industries becomes more and more diverse and the role of service business is growing. The knowledge and skills in the field respond to the changing needs of enterprises and the society and education and training is developed at all levels, also taking account of the changes in the needs of the working and business life. The role of business skills is even more prominent than before as the driving force of the growth.

Benefits: sensitivity to the expectations of the society and markets, renewability, economic activity, diversification, growth of bioeconomy

To reach the strategic objectives we need to succeed in the following issues:

### **We target publicly funded R&D activity to support the renewal of forest-based business and activities and transition to bioeconomy.**

- We create new competitive services and product solutions through close cooperation between enterprises and research institutes, with export markets as a particular objective.
- We make data compiled by means of public funding available to the actors more widely.
- We target R&D funding in a comprehensive way to the commercialisation of business, products and services of forest-based bioeconomy and to pilot projects.

**We diversify and renew the know-how on forest-based business and activities according to the changing needs.**

- We ensure that the needs for expertise in bio-economy are known and taken into account in developing the content and structures of research and education on forest-based business and activities and related fields, know-how and interaction.
- We reinforce, in particular, business and marketing skills supporting the development and growth of the field.

**We renew the administrative structures to support the competitiveness of the field.**

- We renew the administrative structure with flexible, effective and customer-oriented administration as the objective.

Forest-based industry and other forest-based livelihoods in Finland become increasingly diverse, even if in the future, too, we still also produce pulp, paper, paperboard, sawn goods and products derived from these. Industrial products based on forests are highly significant, but in the future diverse services are going to play a greater role than today in forest-related business. Diversification spreads out the market risks, which means that forest-based business and activities as a whole are less dependent on the economic cycles, thus bringing more stability to the whole national economy.

In support of the renewal and diversification of forest-based business and activities it is important to reinforce multidisciplinary research that supports the objectives of the report. A lot of more research and product development is still needed to make good use of the potential of bioeconomy. The research results must be communicated widely so that new information is efficiently put to practice.

By developing research cooperation between enterprises in different sectors and research institutes we can improve the ability of research to promote the renewal capacity of forest-based business and activities. The cooperation must be closer than today as well as linked to active dialogue with the citizens and various stakeholder groups. Enterprises take an active part in the planning and implementation of research programmes and allocation of resources for these in order that the research responds better to the needs of all actors. Enterprises with lots of courage that are capable of unprejudiced thinking and have the will to grow and develop into actors on the international market are needed as

partners and implementers of development projects. Development cooperation that brings together the interfaces between sectors and different kinds of expertise is vital for the renewal of the field. This also comprises diverse utilisation of the opportunities offered by the information society.

Achieving economic growth calls for right kinds of knowledge and skills and their efficient utilisation. Education, training and research in the field are targeted in a flexible, anticipatory and efficient manner in line with the demand of the enterprises and society. Cooperation between education and training organisations and work and business life supports the future needs for knowledge and skills. The degrees and education and training programmes must be flexible and customer-oriented and the know-how of the field must be expanded by recruiting people from other sectors as well. Further development of the know-how of the people already working in the field is also important. Developing education and training into a multi-sectoral direction that favours innovation supports the diversification of forest-based business and activities. Interaction and cooperation between the students in the field and working life should be increased as well.

Balancing the public economy requires lighter, cost-efficient and effective administration. Cooperation will be increasingly important in the future, and new operating models need to be found to lower the sectoral boundaries.

**3. Forests are in active, sustainable and diverse use**

Healthy and abundant forests that are rich in biodiversity allow their growing and diverse utilisation and ecosystem services. Commercialisation of new products and services enhances the tangible and intangible welfare derived from forests. The valuation of active and diverse use of forests is even more prominent than before as the society utilises more and more of the natural resources. Customer-oriented services, structure of forest ownership and skilled people make it possible to utilise forests more actively. Besides the private forests, the forests owned by the state have an important role in generating forest-based welfare.

Benefits: diverse ecosystem services and their utilisation, maintaining biodiversity, increase in recreational use of forests, improving carbon balance, profitable forestry

To reach the strategic objectives we need to succeed in the following issues:

**We create the conditions for business-like and active forestry, for example, by developing taxation and improving the structure of holdings and forest ownership.**

- We create the conditions for profitable forestry and investments in forest management and remove legislative obstacles to practising business-like forest-based livelihoods.
- We consider whether taxation could be developed to promote active and business-like forestry.

**We maintain comprehensive and up-to-date spatial information relating to forests and allow its wide utilisation by facilitating the access to and use of information.**

- We produce and use spatial information compiled by means of public funding and the related services efficiently to address the needs of forest owners, actors and citizens.

**We diversify the management and use of forests and improve their productive capacity.**

- We develop diverse forest management methods for the various needs of forest owners and business activities.
- We develop the forestry subsidies schemes so that the financing is effective and cost-efficient in terms of the forest policy objectives.
- We develop the production methods of natural products in forests.
- We enhance the opportunities of forest owners to engage in gainful activities by commercialising ecosystem services.

**We secure the biodiversity of forest nature, ecosystem services and ecological and social sustainability of forests.**

- We develop nature management in commercial forests as part of sustainable forest management and secure sustainable water and nutrient cycling to maintain and promote the good status of waters.
- We develop voluntary means and market mechanisms for protection and the representativeness, coverage and good management of the network of protection areas.
- We promote climate change adaptation and control the carbon balance of forests through diverse forest management.

- We create the conditions for growth in the recreational use of forests and to promote the health impacts.
- We reinforce the valuation of the use of forests and forest environments and facilitate the access to forests for all.

Forest owners are encouraged to good forest management that is based on diverse objectives. In their active forest management the forest owners may emphasise different kinds of objectives, such as economic objectives, maintaining biodiversity or game animal management. However, informed and active decisions need to be made on the management of forests in order that welfare based on forests can be increased. Active forest management and the necessary investments in forestry secure the growth potential of forests and reinforce the supply of wood and other forest-based products and services. It is profitable for forest owner to invest in forestry when there is demand for wood and when forestry is profitable business activity. Diversified treatment of forests promotes the entry of wood to the market and sustainable utilisation of the harvesting potential.

To promote more active use of forests than at present conditions need to be created for practising business-like forest-based livelihoods and, through these, improving the profitability of forestry. Taxation should support the development of different types of forest ownership to promote active and business-like forestry.

Efficient utilisation of comprehensive and up-to-date spatial information relating to forests supports active and diverse forest management. Opening the access to public data resources is continued as set out by the Government outlines, according to which broad and open spatial information also allows the production of new kinds of services. Spatial information compiled by means of public funds is produced and its usability is improved for the needs of forest owners, actors and citizens. Diverse utilisation of spatial information may also contribute to more efficient recovery of natural product raw materials. The data protection of forest owners is duly taken into account when the access to spatial information is being opened.

Along with the development of bioeconomy and value base of the people the various tangible and intangible benefits are utilised in more diverse ways than now. Diverse utilisation of ecosystem services requires increasingly diverse forest management in a way that the various kinds of forest use needs are reconciled with each other. Through this it is also possible to increase and diversify the opportunities of forest owners to engage

in gainful activities. The diversity and efficiency of forest management can be improved, for example, by allocating subsidies in an appropriate manner and by developing forest treatment methods. Diverse forest management also contributes to securing the biodiversity of forest nature, game animal populations and preparing for risks due to the changing climate. In Finland certification systems drawn up in a participatory process which are independent of any public authorities (PEFC, FSC) are widely used on a voluntary basis to ensure the sustainability of forest management.

Varied forests rich in biodiversity are the ecological base upon which all uses of forests are constructed. Biodiversity is a condition for the recovery and adaptation of the nature, which is why decline in biodiversity needs to be halted. This is also required by the international agreements binding on Finland. The Convention on Biological Diversity also takes account of the respect for and recovery and protection of the traditional knowledge of indigenous peoples in accordance with the national legislation and international obligations.

Ecological sustainability of commercial forests is secured also in conditions where the harvesting volume of wood raw material and harvesting methods are changing. Securing the biodiversity of forest nature depends on both protection areas and nature management in commercial forests as part of sustainable forest management. Biodiversity and ecological sustainability also support wood production, carbon sequestration and adaptation of forest ecosystems to climate change. Nature protection areas are an important part of the value of forests and an important element in the country brand of Finland in international contexts.

Ecologically sustainable forestry takes account of water and nutrient cycling, for example, by developing water protection methods. Climate change may also impact on the soil sensitivity to erosion and, through this, loading caused by forestry. To reduce the loading, efficient water protection measures are needed all through the operating chain. Outlines for water protection actions needed in forestry are set out every six years in the water protection plans and action programmes approved by the Government under the EU Water Framework Directive. For this planning work sector-specific guidelines have been prepared, also for forestry.

Long-term efforts to secure the ability of forests to function as carbon sinks are made through appropriate and correctly timed management and regeneration of forests, by afforesting areas that used to be treeless and mitigating the loss of carbon reservoirs in forests and

forest soil as a result of changes in land use. Old-growth forests and the soil also function as significant carbon stores. Sustainable forest management together with the growing use of wood products and use of wood for energy offer an excellent means for climate change mitigation and adaptation. One way to prepare for climate change is by means of forest breeding to produce more high-quality and productive forests which succeed better in different kinds of climate conditions and are also better capable of sustaining damages.

A balanced relationship to forests helps to understand the entity composed of the sustainable use of natural resources, opportunities offered by forests and limitations set by ecosystems, thus laying the foundation for diverse and sustainable forest management and acceptability of the use of forests. The large number of different types of forest owners as such is a guarantee to the broadly-based acceptance of the management and use of forests. Even if the relationship between man and nature is largely changing towards more emphasis on the environment and conservation aspects, there is a risk that urbanisation may weaken a balanced relationship to forests. The base for the use of forests and forest environment is constructed in childhood, which is why diverse understanding of what forests are all about among children and the young is a precondition for diverse utilisation of forests in the future. Our all-around education offers good opportunities to influence this.

Easy access to forests and everyman's right allowing public access to forests for all are the most important preconditions for realising the wellbeing and health impacts of forests. The welfare impacts and opportunities for business activities improve when more and more time is spent in forests. In terms of access to forests the key issues are the nearby forests, good networks of hiking routes and necessary structures for outdoor recreation as well as access to information in various contemporary media.

## **2.3 The most important sets of measures**

**Success in the measures with the most significant impact is a condition for the growth in welfare produced by forest-related activities. Of the sets of measures described above the most important ones for reaching the strategic objectives and, through this, growing welfare are:**

- We create the conditions for renewal of enterprises in the field through business policy and legislation.**
- We create the conditions for business-like and active forestry, for example, by developing taxation and improving the structure of holdings and forest ownership.**
- We secure the supply of raw materials and improve the functioning of the markets.**
- We target R&D activities by means of public funding to support the renewal of forest-based business and activities and transition to bioeconomy.**
- We secure the biodiversity of forest nature, ecosystem services and ecological and social sustainability of forests**



### 3 Effectives of measures of the National Forest Programme and measures in the near future

#### 3.1 National Forest Programme as the foundation of forest policy

The National Forest Programme 2015 (NFP 2015) adopted as a Government Resolution in December 2010 functions at the moment as the foundation for Finland’s forest policy. The mission of the National Forest Programme is to increase the welfare of the Finns via diverse forest management. The vision of the National Forest Programme is targeted on the year 2020, at which point the goal is that Finland’s forestry field

has developed into a responsible pioneer in bioeconomy, the business activity based on forests is competitive and profitable, and the biodiversity of forest nature and other environmental benefits have become stronger.

One of the pivotal ideas behind the National Forest Programme is the reconciliation of various modes of forest use. Work on this reconciliation is done in the broadly-based National Forest Council and its bodies. The National Forest Programme (NFP) was prepared on the basis of extensive cooperation with interest groups. The programme has also been coordinated with various strategies (Figure 2), for example, the Bioeconomy Strategy, the Strategic Programme for the Forest Sector (MSO), steered by the Ministry of Employment and the Economy, the Energy and Climate Policy Strategy, National Biodiversity Strategy, and rural and regional policy strategies and programmes. The Forest Biodiversity Programme for Southern Finland METSO is being implemented alongside the NFP, and its measures are included as part of the NFP.

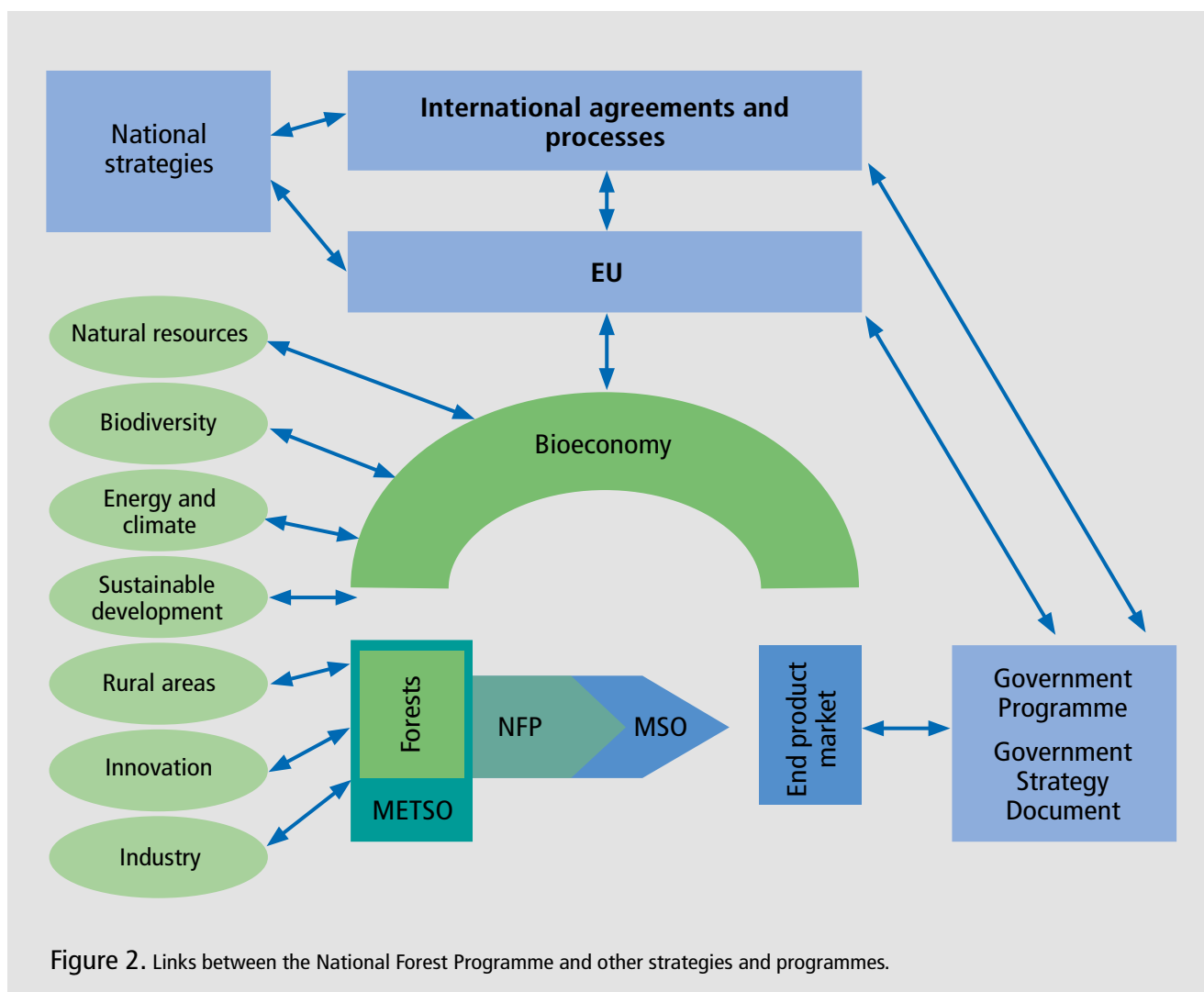


Figure 2. Links between the National Forest Programme and other strategies and programmes.

Changes in the operating environment of forest-based business and activities raise the need to further specify both the short and long term forest policy objectives and sets measures to achieve the objectives. Specification of the NFP for the short term follows the policies approved by the Government, while in the longer term more significant changes in the policy priorities are needed.

The NFP 2015 is based on three objectives (Figure 3): strengthening forest-based business and increasing the value of production, improving the profitability of forestry, and strengthening forest biodiversity, environmental benefits and welfare implications. The attainment of these objectives is supported by means of cross-cutting themes: diversifying and strengthening forest-sector know-how and increasing contribution to international and EU-level forest policy development. Targets have been set for each objective and cross-cutting theme and measures to attain them have been presented.

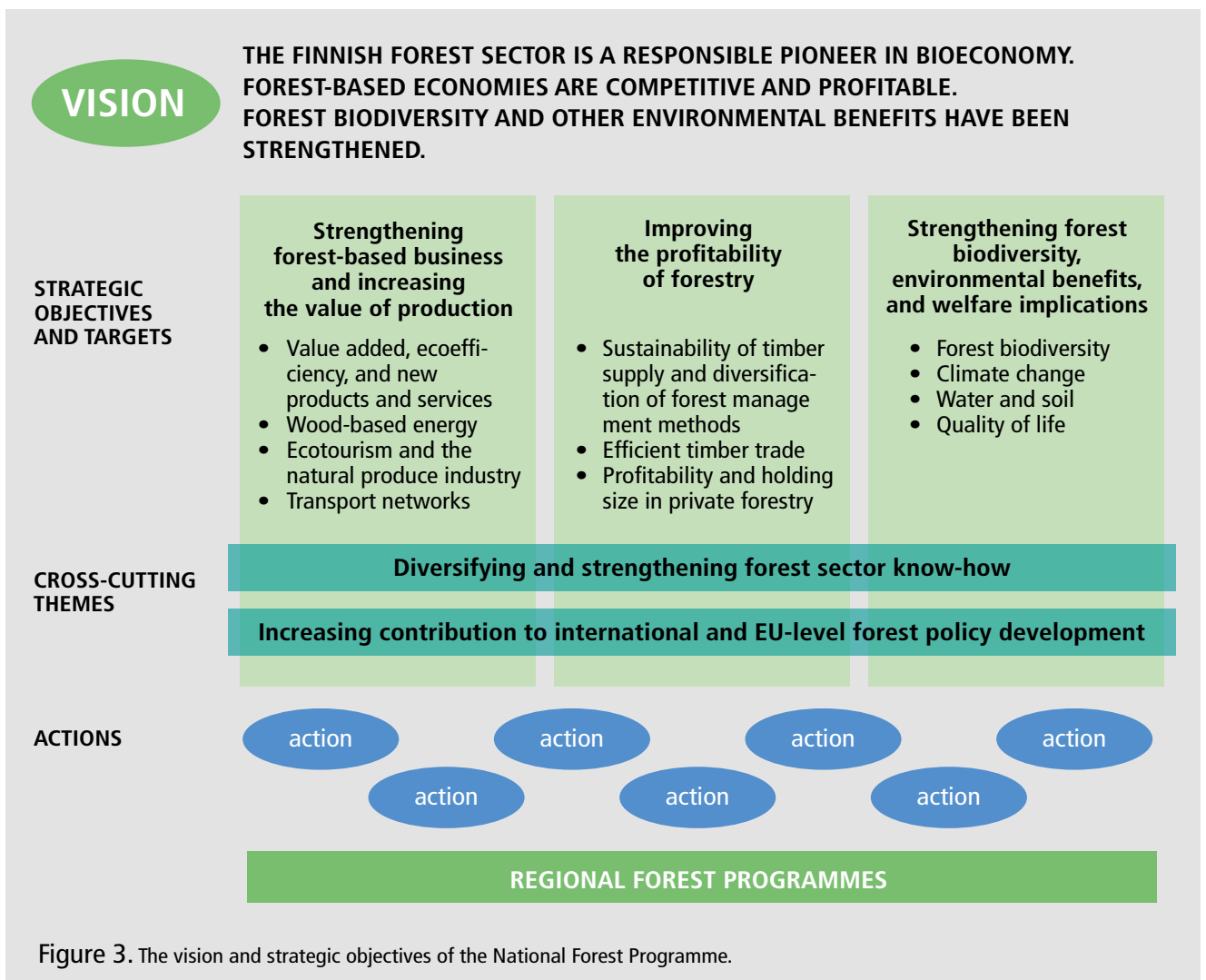


Figure 3. The vision and strategic objectives of the National Forest Programme.

### 3.2 Attainment of the objectives of the NFP and effectiveness of the measures

According to the mid-term review of the NFP 2015 by Gaia Consulting Oy together with Forestry Development Centre Tapio completed in June 2013, all the NFP objectives are relevant in terms of the competitiveness of forest-based business and activities and Finland's welfare. However, the objectives and measures should, according to the mid-term review, be prioritised to take the NFP in a more strategic direction and to serve the development in the field more effectively.

Because the effectiveness chains are long, it was often not possible in the mid-term review to identify the impact of the NFP measures among the other factors influencing forest-based business and activities. This being the case, it was noted in the review that the various changes in the operating environment have more impact on many of the objectives than the NFP measures. In addition, it must be noted that the measures of the NFP 2015 have been implemented for only three years period, but the impacts of many measures can be seen only over a longer time span. According to the review, the added value of the NFP is primarily seen in the mutual discussion and as the future scenario of forest-based business and activities. This added value can, however, be utilised in the steering of administrative activities.

According to the mid-term review, the NFP has steered the activity of the Ministry of Agriculture and Forestry and its administrative sector, but not the operations of other administrative sectors and interest groups in a way that was hoped for. Thus it can be said that the NFP has been the most effective especially with respect to measures in the administrative sector of the Ministry of Agriculture and Forestry. The increase of added value and the implementation of the objective concerning new products have been the task of the Strategic Programme for the Forest Sector (MSO), steered by the Ministry of Employment and the Economy, whereas ecotourism, processing of natural products and commercialisation of intangible benefits of forests have advanced via the Rural Policy Committee. Measures have also been implemented by several actors in the field of forest-based business and activities. To improve the effectiveness of forest policy, there is a need to strengthen cooperation between the different administrative sectors. There is also a need to target measures in the future to supporting objectives that the public sector can influence.

According to the follow-up of the NFP, what has succeeded includes, for example, the overhaul of forest legislation, organisational reforms, development of the forest resources data system, and measures to increase the turnover and employment in heating enterprises. According to the mid-term review, the impact of measures is seen, in particular, in the functioning of the wood market as well as in drawing attention to biodiversity, environmental benefits and cultural values.

In the follow-up of the NFP the strongest negative trends were observed in the development of impact indicators relating to raising the added value. The value of production in the forest industry, added value and value of exports have declined, and it has been challenging to maintain the share of R&D investments in the turnover even on the starting level. From the national economy perspective, the development of the most important indicators appears to be the bleakest; on the other hand, these are the indicators that are the most dependent on the market situation. Exports have suffered from the general economic situation and the decline in the demand for paper. The capacity utilisation rate has been particularly poor in the wood product industry. Moreover, the decline in the value of forest industry production affects many other NFP objectives, such as the operating result of private forestry and roundwood harvesting. From the perspective of assessing the effectiveness of forest policy, it is challenging that the realisation of the objective concerning the increase in added value can be influenced only indirectly by improving the operating environment. **In the future it will be necessary to develop more effective actions to create a competitive operating environment for forest-based business.**

According to the follow-up of the NFP, the challenges of improving the profitability of forestry are linked to increasing domestic roundwood harvesting volumes, operating result of private forestry and average size of forest holdings. Roundwood harvesting volumes have been affected by the decline in the demand for wood products due to the general economic downturn and, with regard to certain paper grades, structural changes in consumption habits. In addition, the ageing of forest owners and the fragmentation of forest holdings reduce interest in active forestry, which is reflected in the harvesting volumes. The operating result of private forestry is in turn dependent on the realised harvesting volume and stumpage prices. Measures to raise the average size of forest holdings have been proposed, but there has not been the will to implement many of them.

Of the measures connected with strengthening the biodiversity of forests, environmental benefits and welfare implications, only the achievement of area objectives of the METSO programme appears to be unlikely. In order to achieve the objectives, additional resources should be directed to the METSO programme. The other objectives of the METSO programme have been implemented in accordance with the Government Resolution. The successes include a slight increase in decayed wood, exceeding the target level in carbon sequestration and accumulation, preservation of the number of children and young people participating in forest-related events, and the continuation of the inventory of cultural heritage sites in commercial state forests in keeping with the target schedule. The increase in the amount of decayed wood is affected by management measures in commercial forests such as retention trees, undertaken since the 1990s. Carbon sequestration is influenced by good forest management, due to which the increment in the growing stock has already exceeded 100 cubic metres per year.

### 3.3 Measures of the National Forest Programme

On the basis of the mid-term review and follow-up it can be said that there is no need for revisions to the objectives of NFO 2015 for the rest of the programme period. The development of the NFP indicators is also going in the right direction, also with regard to indicators that can be influenced only indirectly by improving the operating conditions. The completed and ongoing measures are also taking the development in the right direction. The key measures of the NFP were the following:

1. To develop the conditions for forest-based business and competition and the growth of service markets, target research and development activity and corporate funding to the development of new products and services, improve the competitiveness of current products and increase eco-efficiency.
2. To intensify the innovation system of the field by developing research structures and by safeguarding long-term funding for research, development and innovation activities in the field.
3. To promote good and more diverse forest management by renewing forest legislation and by developing a forest resource database as well as advice and service provision for forest owners.
4. To safeguard funding that promotes sustainable forestry and energy use of small-diameter wood and to renew the related legislation.

5. To expand the size of forest holdings and improve their structure as well as to promote transfers to the next generation by assessing the need for changes in taxation and developing various modes of ownership, reparcelling measures and advice.
6. In order to reinforce and stabilise wood market operations, the work of the timber market working group is continued.
7. To execute the METSO programme, safeguard its funding and promote nature management of commercial forests as well as see to water protection measures.
8. To maintain recreational structures and attractive forest environments as well as renew the Outdoor Recreation Act.
9. To maintain and develop traffic networks to appropriately respond to the needs.
10. To renew forestry training in accordance with the needs of working life at all levels of education.
11. To continue the renewal of forest organisations to improve the efficiency of administration.
12. To exert influence on the international and EU forest strategies supporting sustainable forestry and furthering the operating conditions of the forest sector.
13. To ensure that the calculation rules concerning forests as carbon sinks at international climate negotiations are consistent with the objectives of sustainable forestry.

During the final period of the programme, the ongoing reforms need to be completed. In addition, with regard to the most important measures where the progress has been poor 'new routes' should be looked for. The measures identified as such include the promotion of professional forestry and development of alternative funding models for recreational routes. In addition, based on the Forest Policy Report, Finland's Forest Strategy 2025 will be prepared in 2014, which in the future will function as Finland's national forest programme.

# 4 Analysis of changes in the operating environment of forest-based business and activities

## 4.1 Global change in the operating environment

### 4.1.1 Forest-based business and activities are changing

The ongoing long-term changes in the economy, population growth, climate, ecosystems, technologies, social relationships and values will change the global community in many ways. Finland's forest-based business and activities will also develop and change significantly already over the next ten years. This development will naturally also be reflected in forest policy and other policies affecting the forest-based business and activities. In addition, the scope of forest-based business and activities itself will also change and expand in the future.

Change in the forest-based business and activities is not unprecedented or unanticipated. The livelihood offered by Finland's forests has, for hundreds of years, managed to adapt to the circumstances determined by the global economy, politics and technologies. The forest-based business and activities will continue to produce products and services needed by the society also in the future in accordance with the demand. The impacts of worldwide forces of change on forest-based business and activities will depend on how easy it will be to adapt and effectively utilise the changes on the various decision-making levels. Changes should be effectively utilised to increase in the welfare of society as a whole. Structures of forest-based business and activities should be developed in such a way that it is better prepared to respond to the necessary changes. As a result of this development, the forest-based business and activities will become integrated with the energy and chemical industry, for example, more strongly than now.

Despite the ongoing structural change, the traditional forest sector is still one of the most important sectors creating economic welfare in Finland. The export of forest industry products currently makes up about 20% of our country's overall volume of goods exports. The significance of the production for our national economy is even greater as production factors are mainly domestic. The expansion and internationalisation of Finland's

forest industry have enabled growth in the forest sector, but at the same time it has become increasingly dependent on global trends and markets. Demand for wood fibre and forest industry products in the world impacts on domestic forest industry production and export and, through these, forestry and the value chain of all forest-based business and activities. With the renewal of the forest-based business and activities and diversification of forest use it is possible to obtain increasing welfare for Finnish society from forests.

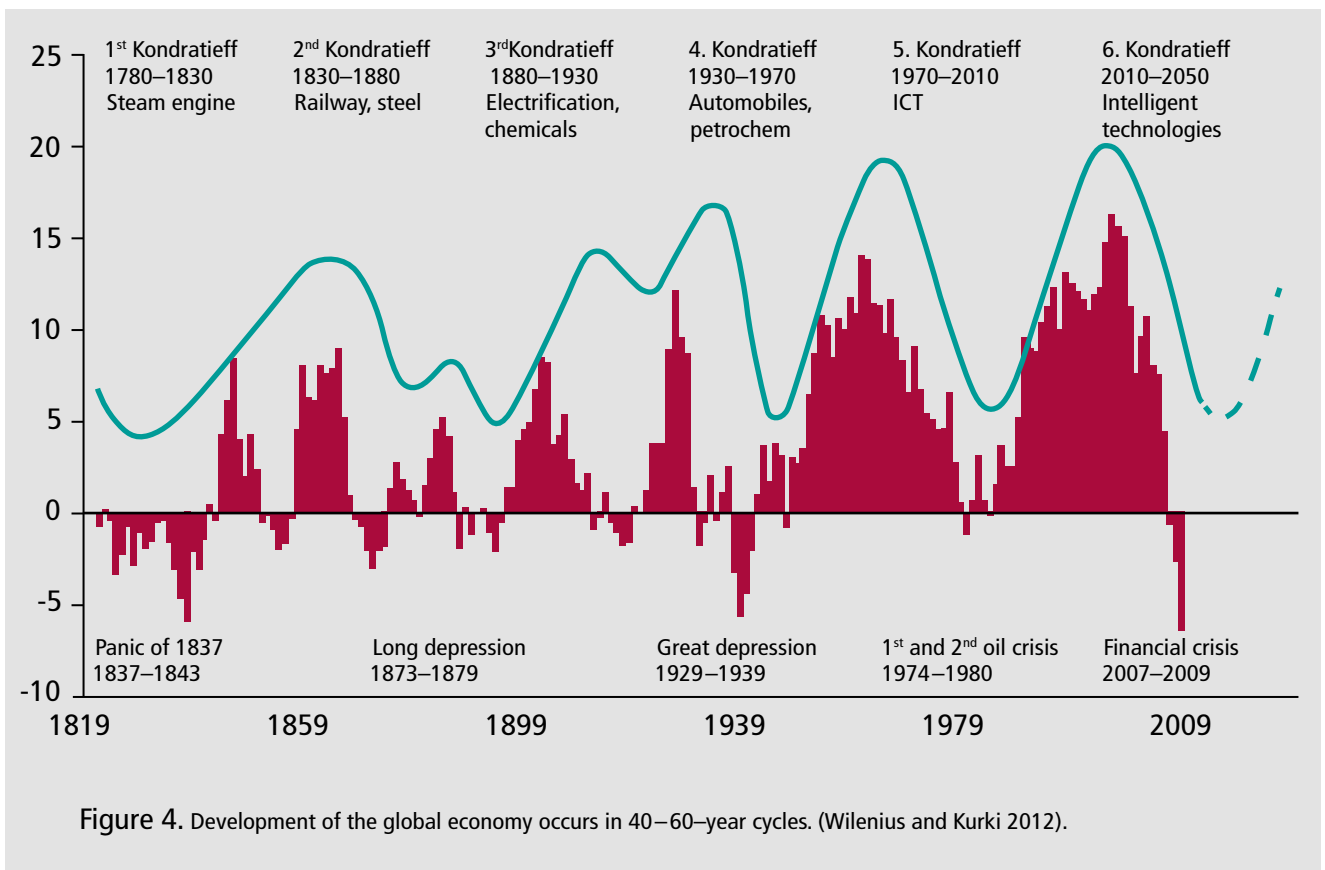
Global economy development can be characterised by cycles created by technical and economic development. According to one theory, a new cycle would now be starting, built upon intelligent technologies (Figure 4). In this transition, focus is likely to be on material and energy efficiency, ICT, bioenergy, environmental and nanotechnology and the development and growth of green chemistry. The role of services in the global economy is likely to continue growing. Major factors behind this development also include climate change and environmental awareness. This cycle is likely to have many impacts on forest-based business and activities as well, which requires but also enables the development of new products and services as well as entirely new business models. The significance of renewable raw materials such as wood will receive more emphasis in the future, which offers opportunities for forest-based business and activities. On the other hand, change also means that there will be structural decline in the demand for some current products.

### 4.1.2 Global trends affecting the forest-based business and activities

The most important global forces for change include population growth, urbanisation, rise in the living standard, growth in the demand for natural resources including energy, introduction of new technologies, scarcity of certain natural resources, decline in biodiversity, climate change, globalisation, development of information technology, and structural change in the global economy. Many of these megatrends are linked to each other and gain their power from population growth and technological development.

#### **Population grows and urbanises and the standard of living and demand for natural resources rise**

The world's population is set to grow from the current about 7 billion to over 9 billion by the year 2050, at which point approximately 70% of the population will live in cities. Urbanisation together with the develop-

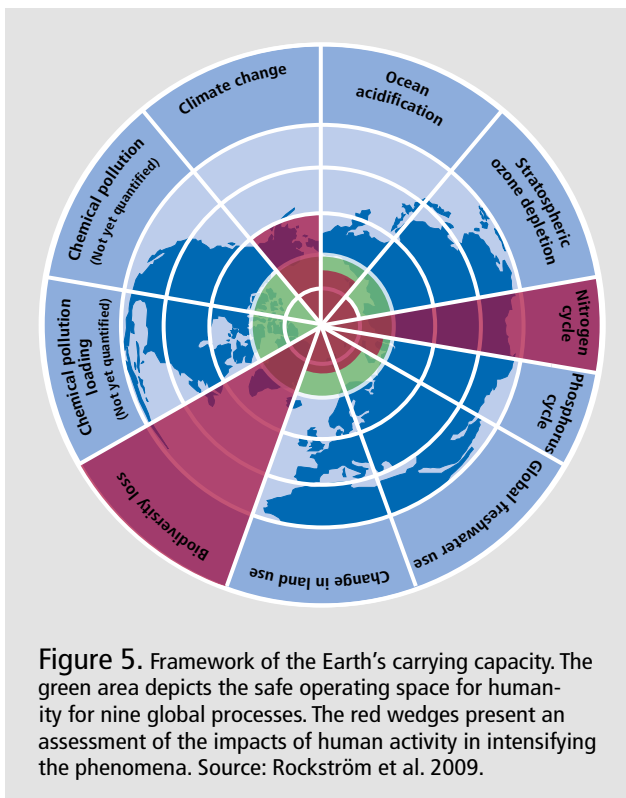


ment of technology, rise in educational level and increase in the labour force as well as growing trade in services and research and development activities will promote the growth of the global economy. The growth of the global economy will enable growth in the standard of living, general welfare and consumption in most parts of the world.

The growing population and rise in the standard of living will significantly increase the demand for energy, food, water and raw materials in general, including wood. Consumption of forest products will grow on the global level. The demand for natural resources will be the greatest in Asia and Africa, where population growth and the rise in the standard of living are the most rapid. For example, the need for wood fibre in India is anticipated to more than double by the year 2021, at which time the country will rival China as a significant wood fibre importer. The rise in the standard of living enabled by growth in the global economy will also increase the demand for higher value-added forest products and forest-related non-market benefits, such as the possibility to use forests as a recreational environment. The growth in demand for biomasses will provide excellent opportunities for production growth and business.

The need for energy will increase with the growing population and world economy and urbanisation. In order to satisfy the growing requirements and mitigate climate change, new energy-efficient technology and renewable energy will be needed, and its share is expected to grow by 2035 to about 30% of all energy production. Use of biomass in energy production and use of biofuels will quadruple and their international trade will increase, but fossil fuels will still retain their global position for a long time as the largest source of energy.

The need for raw materials for the growing population and changes in consumption habits connected with the rise in the standard of living will raise the demand for natural resources. While the demand for natural resources keeps growing, they will be used more effectively, and technological development will also enable the utilisation of natural resources that have remained unused. In some respects we are nevertheless approaching or exceeding the limits of the planet's carrying capacity (Figure 5). The problems this gives rise to include greenhouse gas levels in the atmosphere, availability of clean water, changes in land use and decline in biodiversity.



With respect to biodiversity we are globally speaking already transgressing the limits of the planet's carrying capacity (Figure 5). Efforts have been made to react to the decline in biodiversity via, for example, protective measures and nature management. The total extent of protected areas has indeed grown, covering currently 13% of the world's land area, even though the protection level varies regionally. Without significant policy actions, biodiversity is anticipated to continue to decline on the global scale by 2050.

The growing consumption of forest products increases the demand for forest land. At the same time, the need for agricultural land will increase throughout the world until 2030, after which – due to the slowing population growth and the rise in agricultural productivity – the growth is expected to start receding. In addition, demand for biofuels will increase the need for cultivated land to be used for energy production. By 2050, the increasing production is likely to reduce the global forest area by 13% from the present, thus reducing biodiversity and increasing greenhouse gas emissions when using the current technologies. With successful resource-efficient new technologies, however, some of these trends can be reversed.

Some states and private actors have made land acquisitions from abroad to safeguard the production of food and energy in the future. Land acquisition has been fo-

cused on the developing countries but is expanding in Europe as well, especially Eastern Europe. For example, the EU's growing demand for biofuels will be partly satisfied with increased production in the tropical nations. This means that the export and import of wood and biomass can be expected to grow globally.

### The climate is changing

Greenhouse gas emissions to the atmosphere have increased considerably due to human action, and also with respect to climate change the carrying capacity of the globe has been exceeded (Figure 5). Substantial changes are anticipated in temperatures unless rapid actions are taken. The predicted changes vary from region to region, and certain countries are expected to also benefit from the change.

Climate warming is likely to cause depletion of nature and lead to social problems in some parts of the world when the acquisition of food and clear water becomes difficult in the regions. Climate change has already affected ecosystems and, according to forecasts, its impacts are likely to be even more powerful in the future. Its impacts are anticipated to differ in the southern and northern parts of the world, as well as in southern and northern Europe. The Southern Hemisphere is likely to suffer from drought and heat, which may lead to, for instance, weakened economic development and climate-induced social displacement. Conversely, the economic and strategic value of the northern regions of the globe may increase if the natural resources of the Arctic Sea region can be utilised more effectively than before.

### Globalisation and information technology are advancing

Along with globalisation the various parts of biomass value chains, as well as those connected with other raw materials, will be more strongly distributed between different parts of the world than today. In countries with high costs, operations will focus on product development and tasks linked with marketing, even if production itself moves more and more to low cost level countries. Among other things, the focus in paper and pulp production has switched to countries with lower production costs, even if over time the production in the developed and under-developed nations come closer to each other. On the other hand, new technologies and products create competitiveness in the developed nations, and the trends may also be reversed.

Internet and the digitalisation of information continue to change the operations and competition of all busi-

ness enterprises. As a consequence of information technology development, the use of printing and writing paper in communications and advertising will by 2050 to a large extent be replaced by the electronic format, also in the developing nations of Asia and Africa. Information technology is enabling new products and applications for the forest sector – such as smart packaging, which are already being developed.

### **Structure of the global economy is changing**

The global economy will grow, according to OECD estimates, at an average rate of about 3% a year during the next 50 years, but the growth will slow down after the year 2030. In the future, the engines for economic growth in the world will be the developing nations. The development of the emerging economies will be rapid and, according to forecasts, the gross domestic product of China, India, Brazil, Russia, Mexico, Indonesia and Turkey combined at the end of the decade will be greater than that of the current G7 countries. Consequently, in the coming years a development will occur where the global economic giants and world maps based on foreign trade flows will be transformed. The impacts of changes in trade flows will naturally be reflected in the forest-based business and activities as well.

The structural changes taking place in the world's fossil fuel markets may have significant impacts on future regional priorities in the world economy. The investments of the United States in energy production will reinforce its position in the global economy. Lower energy prices in the United States will significantly increase the competitiveness of its exports compared to, for example, Europe. In 2020 or so, the United States is likely to become the world's largest producer of crude oil. Crude oil trade flows and supply may turn from the countries of the Middle East to the Asian markets, meaning that Russia's weight would decline as a crude oil and natural gas supplier in Asia. This would in turn weaken the Russian economy, which is heavily dependent on energy exports.

#### **4.1.3 Trends in international and national forest-related policy**

The problems of the current world policy organisations and systems may lead to the birth of new organisations that, as the world becomes increasingly multipolar, may become separated to drive their own regional interests. The growing economic influence of emerging economies increases the opportunities of developing countries to function independently or form groups to formulate common policies which may not necessarily include, for

example, the perspectives and norms of European policies. The role of the UN may diminish because it has not succeeded in promoting the generation of comprehensive solutions in, for example, climate policy. The problems of the negotiations geared towards the liberalisation of trade and investments within the World Trade Organization (WTO) will likely increase the number of both regional and bilateral agreements. There are already signs of growing protectionism in trade policies.

Because the EU does not have a statutory common forest policy, international environmental legislation and its increasing amount will be a major factor affecting the forest-based business and activities. In addition, the agricultural, rural development, biodiversity, energy, climate, trade, economic, fiscal, employment, regional and competition policies of the EU have a strong impact on the forest sector. For example, the implementation of the EU's climate policy objectives usually weakens the relative competitiveness of the region concerned if significant nations decide to exclude themselves from the UN climate agreement. In European policy, for example, material efficiency receives a great deal of emphasis. The objective is a lower-emission society that we have now, and work to achieve this is done via sustainable bioeconomy. The European Commission communication on EU Forest Strategy of 20 September 2013 aims for better coordination of policies concerning forests in the EU decision-making processes. The objective of the strategy is the promotion and safeguarding of sustainable forestry, the balancing of different uses of forests, and promotion of a competitive and profitable bioeconomy value chain.

In Finland, the national bioeconomy, biodiversity and energy and climate strategies are, together with the current National Forest Programme 2015 – the future forest strategy – the main strategies influencing the forest-based business and activities in Finland. In the Bioeconomy Strategy currently under preparation, an attempt will be made to steer the development of the society towards a low-carbon and resource-efficient society where the sustainable use of natural resources is a key priority. The Finnish Bioeconomy Strategy will steer the planning and implementation of all programmes and strategies relating to the use of natural resources. In Finland's Government Programme, one of the long-term objectives is a carbon-neutral society.

The diversification of the policy connected with forests and the forest-based business and activities makes it more difficult to predict. From the perspective of the forest-based business and activities, it is particularly challenging that often the factors of change from outside



the field have more impact than decisions made within the field itself. Because of the increased complexity and changes of the policy, its follow-up and search for ways to make an impact are more important and more challenging than before. Often the objectives goals and implementation means of sectoral strategies or those relating to a single set of issues may be mutually contradictory, which makes it difficult to reach broader social objectives. The increased complexity of the policy is also a consequence of the diversification of forest-based business and activities and actions across the traditional sectoral boundaries. Thus in the future a certain policy may benefit some of the actors in the field while being disadvantageous to others. From the perspective of the actors, predictability of the policy would be important for the development of the society, including the promotion of innovation and costly long-term investments in the production.

## 4.2 Change in the operating environment in Finland

### 4.2.1 Economic development

In comparisons conducted by the World Economic Forum (WEF), Finland has ranked among the three most competitive countries in several years. This means that conditions for the development of the forest-based business and activities in Finland are very favourable. Finland's excellent ranking in terms of competitiveness is particularly based on the functioning of its economic and social institutions and between them, innovation, as well as the health and high expertise of its citizens. High expertise and innovation, in particular, are strong competition factors for Finland's forest-based business and activities and they should have a central role in its development. Moreover, in the recent comparison by the World Bank, for example, Finland was listed as eleventh amongst the 185 countries assessed with regard to the preconditions for entrepreneurship.

The current global economic situation is also reflected in forest-based business and activities in Finland. The financial crisis that affected the world economy began in the United States in 2007 and arrived in Finland in 2009, at which point Finland's gross domestic product shrank almost 9%. The financial crisis was followed by a debt crisis reinforced by a strong recovery policy which struck the eurozone in particular. This debt crisis still affects the economic development of Finland and Europe. The short-term economic cycles alone do not affect the economic development of Finland or Europe over the long term, but the current economic situation has ac-

celerated the structural change of Finnish industries. The most fundamental transition is indeed happening in the industrial structure, as the production in the paper and electronics industries has declined. Besides this, the debt crisis showed clearly that Finland should also make structural adjustments to the public sector in relation to economic development and competitiveness, the declining relative weight of Europe in the global economy, and the weakening dependency ratio. Finland should also diversify the structure of industries so that the deteriorating competitiveness of important sectors would not so strongly affect the entire national economy.

According to forecasts, Finland's economy will suffer over the short term from the extended slow growth phase and the unfavourable impacts of the changes in the production structure. Moreover, ageing of the population is weakening the prerequisites of economic growth and increasing public expenditure, particularly for health and social services. In 2012, Finland's gross domestic product shrank 0.8%, and export declined about 1.5% from the previous year. As a consequence of export decline, Finland's trade balance has shown a deficit for several years. The current trend in the trade balance cannot be explained by the current economic cycles alone but the structural change in Finnish industry also impacts on the decline.

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. Success in structural reforms in relation to competing countries would have broad impacts on Finland's operating environment and forest-based business and activities. Moreover, it must be noted that, contrary to its earlier economic history, a new growth curve in Finland's economic development will not necessarily be founded on specific individual products. Finland's economy, and forestry as part of that, will be further diversified.

According to the estimates, the share of services in Finland's gross domestic product continues to grow and the shares of the processing industry and primary production will decline. In the developed nations, this change has in many cases already gone farther than in Finland, so this trend is very likely to continue. The share of services in total production and total number of the employed currently comes to about 70%. The development is well illustrated by the fact that e.g. at the turn of the 1950s the shares of primary production, services and processing in the total production of the national economy were about the same.

Finland's domestic market demand is affected by the population's consumption potential and preferences. The new generations appear to be, generally speaking, more affluent than their predecessors, which is likely to increase the demand for higher value-added products and, in particular, services. In addition, the environmental awareness of citizens is increasing, which adds to the demand for the sustainability of production and for ecotourism and well-being services. The same development linked to the prosperity of the population and environmental perspectives concerns Finland's neighbouring areas, which also promotes, in a sustainable manner, the market potential of high value-added products and increases the potential clientele of Finnish service entrepreneurs.

#### 4.2.2 Forestry and forest ownership

There is abundant potential for supplying wood in Finnish forests, because the utilisation rate of timber in recent years has been approximately 77% that of the calculated sustainable harvesting potential. In addition, the age structure of Finnish forests is such that the harvesting potential will increase in the future. Unless the competitiveness of the forest industry improves from the present, the use of roundwood by paper industry in 2020 is anticipated to be approximately one-third lower than in 2007. The growth in the use of bioenergy in heat production and combined heat and electricity production and, for example, new investments in liquid biofuels production will, on the other hand, increase the use of wood. However, the other new products in wood processing will not, according to the estimates, significantly increase the overall use of wood by 2020, even if

they may increase the value of the production already in the short term and improve the competitiveness of traditional products e.g. through the utilisation of side streams.

The significance of private forests in wood production is great, because approximately 80% of domestic roundwood used by industry comes from private forests. The average age of forest owners continues to rise. The operations and activity of private forest owners on the wood market are a high priority in terms of industrial wood procurement. Private forest owners have traditionally managed their forests well, even if the average forest holding size is considerably smaller than in e.g. Sweden. Delivery sales of roundwood represent about a fifth of the felling in private forests and about half of the forest owners take forest management measures on their own initiative. Moreover, the broad forest ownership base has also contributed to the acceptability of forest management and use.

In the future forest owners will be city-dwellers, more highly educated and economically less dependent on forest income than before. Despite the change, forests will be managed and used actively if the prerequisites for profitable forestry are preserved. This means that in the context of active forest management the necessary investments are made, with the returns often realised only during the following generations. The change in the forest ownership structure further increases the need for electronic services and development of service markets for forestry. The increase of business-like forest ownership would benefit both the industry using wood as wood procurement is eased and the entire society in the form of increased tax revenue.



### Scenarios for forest-based business and activities by means of FinFEP modelling of the Finnish Forest Research Institute

The FinFEP (Finnish Forest and Energy Policy) model developed at the Finnish Forest Research Institute was used to estimate the trends in the use of pulpwood, logs and energy wood until 2050 in three alternative demand scenarios, and the impacts of these development paths on the wood markets, forest age structure and volume of the growing stock. In addition, the impacts of the protection of old-growth forests in southern Finland were simulated.

According to the scenario models, roundwood harvesting will increase due to the strong growth in wood supply, as a consequence of increase in forests that are mature for harvesting. The expected growth in wood supply is also based on the assumption that the preferences of forest owners stay the same as they are now, i.e. do not impact on the willingness to sell wood. The use of forest chips varies in the scenarios, while the use of roundwood for energy grows in all scenarios due to the increased supply of wood.

The surface areas of older age classes will increase significantly in both spruce- and birch-dominant forests in southern Finland. The volumes of stands dominated by conifers will double by 2050, while the volume of birch will remain on the current level. The increase of the growing stock volume suggests that Finland's forests will function as carbon sinks at least until 2050 and, in addition, the forests will function as much larger carbon reservoirs than at present.

The protection scenario considered the additional protection of 100,000 hectares of forests over a hundred years old in southern Finland. Protection reduces the supply of wood and raises the price of wood, which leads to increased harvesting in forests excluded from the protection. The impact of the protection programme on the overall surface area of old-growth forests will thus be smaller than 100,000 hectares. This kind of leakage effect that may arise in connection with the protection programme increases the unit costs of protection.

Imported wood is estimated to be an important source of raw material also in the future as the diversification of the use of forests, including increase in protecting forest biodiversity and recreational use, may at least in some areas reduce the harvesting potential. In addition the supply of, for example, birch has not been sufficient to meet the industrial demand. On the other hand, on the basis of the National Forest Inventory (NFI) calculations, the harvesting potential will increase significantly in the decades to come. The FLEGT initiative (European Forest law Enforcement, Governance and Trade) guarantees the supply of sustainably produced imported wood for the Finnish forest industry, including tree species not available in Finland. By supporting the FLEGT Finland can make a contribution to sustainable forest management on the global level. The amount of imported wood will be strongly affected by trade policy in the future as well. Through trade policy we can influence the Russian export duties both bilaterally and in the EU contexts. On the other hand, wood exports from Finland to, for example, Central Europe may grow as a result of growth in bioenergy production. These trends are also influenced

by the creation and implementation of the sustainability criteria.

#### 4.2.3 Employment and need for education and training

The employment structure of Finland's national economy as a whole has changed over the last few decades. The share of jobs in the service sectors has grown continuously with the reduction in the share of processing and primary production as a result of, for example, higher productivity. This development has also been seen in traditional forestry, which employed 2.8% of our national workforce in 2011, whilst the corresponding figure in 2000 was 4.1%. In the future the need for labour in forestry is likely to decline due to the increase in productivity brought along by the mechanisation of forest management work. The productivity of labour can be improved in a sustainable manner by expanding the job descriptions and know-how among the manual workforce.

There are great employment expectations relating to green growth. It is expected that in the future new jobs based on the manufacture and development of new biomass-based products will be created. These include bioenergy and transport biofuels, chemicals based on wood biomass, and new materials. Green technology jobs will likely be mainly based on export markets. Jobs should be created especially round the product development of new products and, for example, piloting, which means that the added value of the work input is substantial. In addition, services based on forests are expected to employ more people in the future than today. Nevertheless, the green sector will not necessarily substantially increase the overall number of jobs, because some of the new jobs will replace old ones. In the future, training in the forest sector should be diversified to respond to the new opportunities. At the same time, the expertise of people working in the forest-based business and activities should also be diversified.

It is estimated that basic vocational education in forestry should be increased by almost one-fifth, even if the overall number of jobs in forestry is declining. The need for education is the consequence of large numbers of people leaving the sector and growth in the demand for forest services. In particular, the availability of forest machine operators and timber truck drivers must be secured. On the other hand, it may be necessary to reduce traditional university-level education in forestry, unless the growth and diversification of forest-based business and activities is realised. The need for forest education in universities of applied sciences is expected to increase. The content of the education should be developed so that it offers the starting points for development of forest products and services in line with the new trends. Forest education should be marketed to attract young people to the field.

#### 4.2.4 Values and attitudes

People's relationship with nature is changing in a direction where more consideration is given to the environment and its preservation and the values of forests beyond their wood production values have become more important than before. In the long term ecosystem services produced by forests other than wood production, such as recreational use and cultural values, are receiving more emphasis in the trends influencing the operating environment of forest-based business and activities in Finland. In the future, the reconciliation of the various uses of forests will be even more important than before.

The growth of the population, climate change and the decrease in renewable raw material resources seem to have a positive impact on the acceptability of the management and use of forests. The sustainable use of renewable natural resources is in general seen as one solution to the challenges brought along by the megatrends.

### 4.3 Impacts of changes on forest-based business and activities in Finland

#### 4.3.1 Forest-based processing industry

Population growth, urbanisation and the rise in the standard of living increase the demand for products and services based on forests. In the short term the demand for traditional paper industry products grows the most in the developing countries, where electronic communications have not yet begun to replace printing and writing paper. In many western countries structural reduction in the demand for several grades of printing paper has already started. This can be expected to continue and ultimately spread with time to developing economies as well. Finnish production does not, however, benefit very much from the growth in the demand for printing papers in the developing nations, because the main export markets for Finland's forest industry are likely to be in Europe for quite some time. In the long term, climate change may improve the possibilities for the North-East Passage, which would shorten the transport journey of end-products to Asia.

Besides the growth in demand and structural changes in this, the export opportunities of the Finnish forest industry is influenced by the relative competitiveness of our export. The growth of production in areas with lower production costs in e.g. Asia and South America and regional overcapacity have led to a decline in the prices for printing paper and deterioration in competitiveness in the traditional producer countries. Production capacity has been closed down in North America and Europe, but in some products there is still overcapacity. In relation to price development, structural turn upwards is not on the horizon, as the paper companies are competing not only against each other but also against electronic communications. This means that the production of certain modern printing paper grades will decline in Finland already during the next ten years. This development will have significant impacts on the current structures of the forest industry, because still in 2011 the share of magazine and fine paper was 60% of the value of exports in the whole sector.

The prospects for certain traditional paper and paperboard products are much brighter than for graphic printing papers. The demand for consumer packaging paperboard is expected to grow, because packing is increasing, globally speaking, by about 3% annually. Paperboard consumption has increased with online shopping increasing the packaging of products. On the other hand, along with industrial production the packing of products is also being transferred more and more to low-cost countries, e.g. from Europe to the developing countries. The need for smart packaging will, however, grow globally as we wish to improve, for instance, food preservation, and smart pharmaceutical packages are needed for the ageing population. Household, hygiene and tissue paper have growing markets. In the future, enterprises operating in Finland will invest in, among other things, the production of packaging papers and paperboard as well as bioenergy. In particular, the development of food packaging products looks quite positive from the Finnish perspective.

The demand for pulp based on wood fibre is growing in the world as the need for fibre increases, and it is estimated that there will even be a shortage of it by the year 2020. Demand is also likely to grow due to its environmental friendliness compared with fossil-derived fibres, which accounted for over a half of the world's 82 million tonnes fibre market in 2012. Growth will also be influenced by the downturn in the production of cotton. Over the longer term, the demand for pulp will grow in numerous use applications of nanocellulose and fibrillated cellulose. Nanocellulose can be used, for instance, to improve the properties of paper and paperboard, as a binder in car industry, packaging and construction material industry composites, as co-formulants to control

the consistency of liquids, filters, food products, cosmetics, hygiene items, tissue grafts, transparent film production and displays. Demand for wood fibre in new applications is also increasing in Finland's main market areas, which means that the change can also benefit Finnish production. Especially in short-fibre pulp manufacture, the relative competitive advantage of South America and Asia over Finland will be preserved due to, for instance, the quick growth of trees. Growth in pulp production is also supported by the increase in the demand for and price of other products generated in the process (biofuels, energy).

Technological development may introduce entirely new kinds of production technology to wood processing and, through this, new applications and competitiveness. The transport biofuels or nanocellulose or fibrillated cellulose produced in connection with the pulp industry replace the capacity removed from the production of printing paper. In addition, enormous growth potential is predicted for 3D printers, for example, which could also be utilised in the forest sector.

The dependency of Finland's forest cluster on the traditional paper and paperboard industry products are forecasted to decline, whilst the production of new products in the field should grow and the significance of the wood product industry should increase by the year 2020. In the domestic paper and pulp industry, the greatest opportunities are in the diversification of production by pulp mills and various new fibre-based products. In the future, the increasingly diverse use of other products linked with pulp and its production is likely to separate this from the production of paper.

## Fact box

### Development of the forest, energy and chemical industry in the Cluster Tech II project

In the ClusterTech II project the VTT Technical Research Centre of Finland and Pöyry modelled forest, chemical and energy industry products optimising the production profits in three scenarios, which in the end were combined. Altogether, 46 different product groups were covered, made up of current as well as promising products estimated to have potential to develop into commercial products by 2020. In the modelling, it was assumed that 70% of the current industrial production structure would be retained, even if some other product could produce more added value. In addition, it was assumed that all wood that could be sustainably utilised will be obtained for the use of industry.

All ClusterTech scenarios indicated that the Finnish forest cluster can increase income, profits and jobs. Compared to the current production structure, income in paper industry declined and that of sawmill industry increased. On the other hand, some of the paper industry products were replaced with new products. In the combined scenario, the forest cluster income rose by 5.9 billion euros, profits by 4.4 billion euros and jobs by over 11,000. The income from current products declined, but their profits rose as well.

### 4.3.2 Wood product industry

The same kind of structural reduction as that caused by electronic communications to printing papers cannot be identified in the global factors of change affecting the consumption of wood products. In Finland, the greatest growth potential for wood use is in, for instance, the construction of blocks of flats and public buildings as well as in energy repairs to suburban apartment blocks, which also involve potential for growth in exports. Markets for the wood product industry will benefit from the annual growth of more than 4% in the global residential building in 2015–2020. The most rapid growth will occur in China, the USA and India. In Europe, the efforts to reduce carbon emissions and renovation needs for housing are estimated to increase the use of wood products. Renovation needs will also increase in

the USA with the ageing of housing stock. Demand for wood products as building material is likely to grow significantly also after 2020, often to replace cement and steel.

The production of the Finnish sawmill industry has decreased in the last few years due to the export market downturn in Europe and Finland's weakened competitiveness. However, in the longer term the demand prospects in the field are good if the relative competitiveness is preserved compared to e.g. the East European countries. Moreover, export potential for the Finnish wood product industry may grow significantly if the consumption of wood products per resident in the important market areas rises closer to the level in Finland, Sweden or Estonia. For future success new products and services and increase in added value and customer ori-

#### Fact box

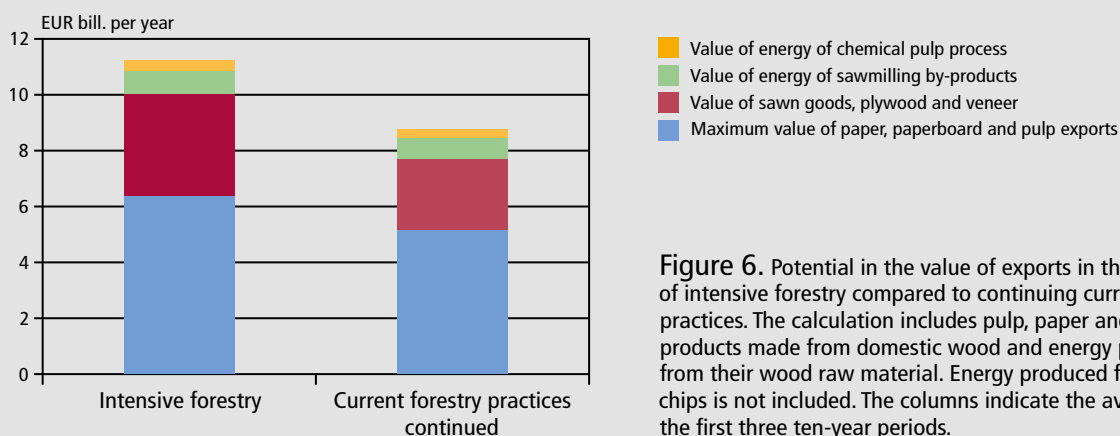
##### Future opportunities of Finland's forest resources on the basis of the FIBIC scenarios and calculations of the Finnish Forest Research Institute

The aim of the scenarios was to examine the potential, cost effectiveness and impacts of more intensive forestry in Finland. The scenarios were analysed from the perspectives of forest management, forest industry and production, wood sales, logistics, forest policy and forest ownership.

As a consequence of intensive forest treatment, the annual harvesting volume could be increased up to 50% to over 85 million cubic metres. Despite the increased harvesting, the sustainable production of wood and biomass is secured over the long term. Intensive production of biomass and high-quality raw material would increase the stumpage earnings by 50% compared to the current level.

Total roundwood removals can be increased by 50% without a decline in carbon sequestration from its current level. Over the long term, intensively managed forests sequester carbon more effectively than those that are extensively managed; climate impacts depend on the way the carbon removed is used.

According to the calculation, the intensive forestry scenario makes it possible to achieve 2.6 billion euros higher export revenue in the next 30 years compared to the scenario where current forestry practices are continued (Figure 6).



**Figure 6.** Potential in the value of exports in the scenario of intensive forestry compared to continuing current forestry practices. The calculation includes pulp, paper and wood products made from domestic wood and energy produced from their wood raw material. Energy produced from forest chips is not included. The columns indicate the averages of the first three ten-year periods.

entation will also be needed. The sawmill industry could also benefit from the developing bioenergy markets as the growing demand raises the price of its by-products. The current forms of aid to renewable energy have not, however, improved the competitiveness of the sawmill industry.

The innovations in the sawmill industry may relate to the development of new kinds of engineered wood products whose production costs would be smaller than before but their added value greater. The development of biocomposites also supports the future of the wood product industry and creates new markets for wood-based products.

#### 4.3.3 Forest resources and bioenergy

Finnish forests are now growing more than ever before since Finland became independent in 1917 and climate change is going to accelerate the growth of Finnish forests even more, particularly in the north and in peatland forests. In this respect, Finland is an example of an area that will benefit from climate change. However, adapting to climate change may bring along pressures to change, also with respect to forest management. Climate change is likely to increase the damages caused by forest pest insects and other forest damages and influence the relations between forest tree species and their distribution. New products in the wood processing industry, services developed round forests, the safeguarding of forest biodiversity and changes in values will also increase the need to diversify forest management.

The production of renewable energy increases rapidly, even if fossil fuels retain an important position as part of energy production. In the EU as a whole, energy consumption based on biomass and waste is estimated to grow 77% by 2030 from the year 2008, whilst at the same time the increase in total energy use will be just 3%. It is estimated that of Finland's primary energy use in 2050 approximately 50% could be renewable, and the use of biomass for energy would increase all over Finland. However, reaching this level is also considered very challenging.

#### 4.3.4 Services linked to forest-based business and activities

Forest-based business and activities offer a wide range of opportunities which are anticipated to have growing demand in the future. Changes in forest ownership

and value base of forest owners reinforce these opportunities. As regards forest-based business and activities the services can be divided into services relating to wood processing products, those relating to forestry and those 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. Services are a significant part of the added value of the products and, like in the current structural change in technology industry, the role of industrial services will receive more weight in the forest-based business and activities as well.

Services relating to forestry are the various forest services targeted to forest owners, which are linked with the planning of forests management or the actual management operations. In addition, there are various forest resource inventory, regional planning, administration, research and training services for forestry. Finnish expertise is also valued internationally, which means that consulting work in the field has frequently expanded into international markets. In the future the demand is going to grow due to the scarcity of natural resources and increased competition for land and demand for wood fibre.

Of the services relating to forests, the most significant ones are the tourism and recreational services. Tourism to Northern Europe is expected to increase at an annual average rate of 2.2% in 2010–2020 and 1.4% 2020–2030. These figures include all sorts of tourism, but ecotourism is anticipated to grow much faster than tourism on average. Finnish nature is a competitive advantage for European tourism markets, and with the increase in environmental awareness, it will become even more attractive. As a result of climate change, recreational and health travel may move from the dry and hot areas in the Southern Hemisphere to northern Europe and Finland and from southern Europe to the Nordic countries. On the other hand, the aspiration towards low carbon may also limit the taking of long journeys.

The global trend is that public funds are insufficient for comprehensive health care for all, which means that individual responsibility will grow everywhere in the promotion of health and well-being. Health and well-being services may in the future be a part of the services based on forests. At the moment, new markets can be developed for non-market ecosystem services, such as services connected with water resources of forests,

which may yield financial benefits to forest owners as well.

#### 4.3.5 Other forest products

Utilisation of raw materials from nature offers significant opportunities to develop 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 combination of natural products with various well-being services and tourism is also significant. In the development of new innovative products and services that are based on forests, cooperation across the interfaces of sectors will be needed, as well as networking amongst the various business areas in the field.

In the forest and chemical industries, broad mutual interfaces already exist. In the future, these traditional industrial fields will approach each other even more when material efficiency as well as new high value-added products are developed. In the future bioeconomy, new applications will be developed for wood, particularly by chemical and biochemical means. In addition, the development of the pharmaceutical industry will enable entirely new applications for wood whose processing values will be significantly greater than those of current wood-based products. The need for the development of new pharmaceutical products keeps growing, and the possibilities to use wood are increasing as the research advances. As a result of new products, businesses in the field are specialising in, for example, wood-based special chemicals, and will typically function in narrow market areas.

#### 4.4 Forests are the foundation of Finnish bioeconomy

The megatrends described above, influencing the operating environment, challenge to changes in the development of the Finnish society as a whole in the decades to come. The global redistribution of the economy is changing the structures of industries. The current base of the national economy is being changed, for example, by the structural changes in the traditional forest industry and technology industry. Challenges are also created by the intensification of climate change and other global environmental problems. Global challenges can also be transformed into new opportunities through strategic action and by highlighting the responsible action of the field. Products and services based on forests have

good growth potential, provided that these can be commercialised and turned into added value and jobs.

Solutions based on bioeconomy are also highly significant for solving the challenges connected with climate change and the sustainability of the use of natural resources. Bioeconomy contributes to the efforts to find new models and solution which reduce our dependence on fossil energy, prevent the depletion of ecosystems and promote economic development and create new jobs. Transition to bioeconomy in the world is inevitable, sooner or later. Countries that first draw the conclusion to follow the development path that leads to bioeconomy will have the competitive advantage. Both with regard to its resources and culturally, Finland has the opportunities to be involved in this development, which is already happening. Transition to a comprehensive bioeconomy and taking a leading position still require leaps of technology as well as new, globally reproducible solutions that combine various raw material flows.

Changes in the global economy and in society call for innovation in forest-based business and activities to enhance our competitiveness. Innovation is linked with new products and services, marketing, processes, the development of organisations and crossing boundaries between sectors. The challenges of sustainable development bring along new business opportunities. When the community strives towards low-carbon economy and resource efficiency, there will be more products and turnover from a smaller quantity of raw materials in the value chains of new forest industry products and other products that obtain their raw materials from forests. This also increases the significance of forest-related services and e.g. the opportunities in tourism and health services relating to forests will grow. On the other hand, the growing production of bioenergy and new bioeconomy products increase the demand for wood and other biomass.

Over the long term, it is critical for the forest-based business and activities in Finland to raise the value of production. In order for the value to grow more industrial investments are needed for Finland, particularly to raise the value added. Growth in the value produced by the forest-based business and activities may also be due to the development and growth of diverse services. In addition, the development of new technologies is likely to create various kinds of new opportunities for profitable production and raising the value added.

Although the new forest-based products will displace some of the current forest industry products, their development will very likely also bring new opportunities for



wood use. In the future bioeconomy, wood will continue to be used to make paper, paperboard and sawn goods, but more and more also for bioenergy, pulp, biofuels and chemicals and new more highly processed products. By 2050, a significant part of forest industry production will take place in the new sectors. New opportunities lie in product groups and services which are characteristically closer to various other industries and operators, such as the chemical industry or design and building companies. Already at present wood processing is more and more an energy industry as well, and this trend will continue even stronger in the future. The disappearance of traditional sectoral boundaries is further reinforced by the more rapid communication of consumer information via e.g. the social media. The development of bio-products in cooperation between various industries and sectors promotes the broadening of value chains in the traditional forest industry and changes in the entire industrial sector. In addition, the diversification of forest-based business and activities reduces the dependence of the field on the economic cycles of a single sector and spreads out the potential longer-term structural risks.

Finland's comparative advantage has traditionally been the greatest in the paper and wood industry, and in the very same sectors the economy is predicted to succeed in the future as well – the products will only be transformed into other ones and into new services. These new products and services will make up a major part of the Finnish bioeconomy, since forests are our most significant natural resource in terms of commercial utilisation. In addition, Finland's forest resources have significant production potential which can be further increased with intensive forest management. Finnish companies will have an excellent opportunity to achieve a leading position in Europe's bioeconomy cluster. In order to succeed, business operations should be both responsible and targeted on problem solving. Future innovations will have to be financed by profit from the present products, which is why it is important to see to their profitability as well. The opportunities of bioeconomy can be well understood through the estimate that the market potential of energy from bioproducts and biomass-based energy will more than double during the years 2015–2030 to about 1,309 billion dollars, whilst growth in traditional forest products will remain at about 10% – from 495 billion to 545 billion dollars.

The development of innovations will naturally require strong product development in the private sector, public research, an environment that is attractive to innovations, as well as commercialisation of new business ideas. More and more risk-taking will also be needed in the

future. This requires a real cultural change from many of the actors in the field and, in particular, from political decision-makers on the level of the society as a whole. Factors that further the advancement of innovations include an excellent standard of science and expertise, the access to risk-funding in new businesses, and open markets for forest-based products.

Functioning and reliable wood markets are a prerequisite to the development of large-scale industry based on forests and for new investments. The fluctuations in wood supply have been regarded as a problem in the wood markets, caused by the fragmentation of forest holdings as well as the ageing and urbanisation of forest owners. Moreover, securing a steady wood supply may also be seen as a problem due to the growing number of passive forest owners. Solutions should also be found to these problems in order to enable development and growth.

All in all, the greatest policy challenge in increasing the welfare generated by forest-based business and activities would seem to be how to create the conditions for new investments and growth in wood demand or to enable other kinds of efficient utilisation of forests. The opportunities of forest-based business and activities would appear to culminate in how we succeed in the development of production and services. Success in this requires that the operating environment has a competitive advantage and the field is capable of renewing and responding to market signals. For example, the scenarios on the development of forest-based business and activities indicate that there is significant potential to increase the value of production, even if most of the current production structure were to stay about the same for the next 10 years.

In order that the forests can be utilised in a diverse manner for bioeconomy products and services, the value chain of forestry and all forest-based business and activities should be profitable. The profitability of the forestry secures wood supply, investments in forest management and growth of forest holdings, and the diversification of forest treatment methods will help to reconcile the various uses of forests. By reconciling the various uses of forests, it will be possible to increase the welfare obtained from forests. The diverse utilisation of forests requires that the forests are healthy, abundant and rich in biodiversity. Safeguarding biodiversity and ecosystem services are among the core elements of bioeconomy.

More diverse utilisation of ecosystem services is important to increase the welfare of the Finns. Opportunities

are abundant from the perspective of both intangible and tangible welfare. The utilisation of natural products e.g. in the food industry or as part of well-being and tourism services brings new opportunities for the development of bioeconomy. The pharmaceutical potential of various forest-based raw materials and compounds produced by plants should also be examined.

Safeguarding the ecological and social sustainability of forests is essential to ensure the demand for forest products and services. On the basis of the scenarios of the Finnish Forest Research Institute, however, protection does not seem to be as cost-effective a means to increase the surface area of old-growth forest as has been assumed. In the future the role of voluntary protection on a temporary basis should be given more consideration as a means to safeguard biodiversity.

For example, in southern Finland about 10% of the forests are over 100 years old even if the level of protection is relatively low.

From the perspective of forest-related policies, it is important to be more aware of the opportunities in the diverse use and management of forests both as a source of tangible and intangible welfare and with regard to the growing significance of services. Over the long term, the management and use of Finnish forests involves a great deal of uncertainty, but at least the policy as such should not constitute an obstacle to the diversification of management and use – quite the opposite it should facilitate these. Thus in the future it will be necessary to take the needs of a larger number of sectors into consideration in the decision-making.



# 5 Impact assessment

The impact assessment has been drawn up by researchers Riitta Hänninen, Teppo Hujala and Pia Katila at the Finnish Forest Research Institute. The assessment was concerned with the outlines for the main measures of the Forest Policy Report and the conditions these create for the renewal of the forest-based business and activities. The report does not set out any detailed recommendations for measures or quantitative objectives, which is why the assessment is a qualitative expert assessment. The changes in the world and in the operating environment in the next few decades cannot be foreseen very accurately, which is why it is also impossible to give any accurate estimates of the impacts of the report in 40 years.

It is stated in the report that success in the measures with the most significant impact is a condition for growth in the welfare produced by forest-based business and activities. The most important sets of measures presented in the report examined for the assessment are:

- We create the conditions for renewal of enterprises in the field and development of new and growing enterprises through business policy and legislation.
- We create the conditions for business-like and active forestry, for example, by developing taxation and improving the structure of holdings and forest ownership.
- We secure the supply of raw materials in line with the demand and improve the functioning of the markets.
- We target R&D activities by means of public funding to support the renewal of forest-based business and activities and transition to bioeconomy.
- We secure the biodiversity of forest nature, ecosystem services and ecological and social sustainability of forests.

**We create the conditions for renewal of enterprises in the field and development of new and growing enterprises through business policy and legislation.**

The value added of the forest industry and the whole forest sector has been falling during the 2000s, and now this trend should be reversed in order that they are again efficient in creating welfare for the Finns. The value added is also influenced by actions in other administrative sectors and actors in Finland, which means that there are limits to the possibilities to impact on com-

petitiveness and demand for the end-products through policy measures. The policy can, however, significantly promote the renewal and innovation in the sector and create new business activities. Measures to this end presented in the report include the efforts to target R&D activities and business funding to new bioproducts, biofuels and services. The aim of the report to support the commercialisation of tangible and intangible ecosystem services across the sectors supports the market access of new innovations and broadening the production. If these efforts do not succeed, the renewal of the forest-based business and activities is at risk.

The aim of the report to increase the use of wood for energy production and as raw material for biofuels also increases the opportunities for new business activities and encourages to the introduction and development of new environmentally-friendly technologies in forest-based business and activities. Public funding has impacts on the behaviour of the forest owners, provision of services to forest companies and supply of forest-based bioenergy. The changing international policy objectives create uncertainty to the renewable energy market. The structures supporting different forms of energy may change, which means that the growth of the use of renewable energy, including forest energy, should be based on the markets rather than policy decisions and support systems. In the longer term forest bioenergy may represent a transitional phase in energy production because wood and forests are likely to produce more value added in other uses.

**We create the conditions for business-like and active forestry, for example, by developing taxation and improving the structure of holdings and forest ownership.**

The demand for ecotourism, tourism based on nature and cultural experiences and recreational use as well as the amendment of the Forest Management Association Act support the growth of service entrepreneurship based on forests which, if it were to be realised, creates new employment and welfare especially in the rural areas. The aim of the report to create the conditions for growth in the size of forest holdings and business-like forestry promotes forest management and the supply of wood. The definition of forestry as an industry encourages investments in forestry and earlier transfers of holdings to the next generation. The statistics show that the number of both the smallest and largest forest holdings is growing, which means that the structure of holdings is polarising. The most significant way of influencing the structure of holdings is through changes in the taxation that support business-like forest ownership.

The aim of the report to develop the planning and zoning system creates the conditions to increase business activities based on forests and forestry in the area concerned. If the efforts presented in the report do not succeed there is a risk that part of forestry is excluded from active wood production and thus part of the use potential of the forest resources remains unutilised.

**We secure the supply of raw materials in line with the demand and improve the functioning of the markets.**

For securing the supply of raw materials the functioning of the markets is in a key position. Stable and predictable wood market is very important, which means that long-term steering instruments are needed. The aim of the report to improve the service capacity of transport routes contributes to securing the raw material supply and competitiveness of enterprises. For the functioning of the wood market support for the electronic wood market system and access to and distribution of forest resources information are also important. Without successful efforts to promote the profitability of forestry and securing the health and good growth of forests, the future opportunities of the forest sector to produce welfare to the citizens are considerably weakened.

**We target R&D activities by means of public funding to support the renewal of forest-based business and activities and transition to bioeconomy**

Inputs in R&D are needed to promote diversification and innovation in forest industry and the whole forest sector, where the production is still largely based on traditional products despite the changes in the operating environment. The long-term prospects involve a lot of new opportunities to forest-based business and activities. The aim of the report to target funding to commercialisation of business activities and products of forest-based bioeconomy and experimental projects promotes the diversification of forest-based business and activities and also supports the objectives of the National Bioeconomy Strategy. It would be important to target support to small and medium-sized enterprises and starting new business activities, partly because extensive business operations often get started from small-scale development activities.

The close cooperation between companies and research institutes proposed in the report diversifies the opportunities of the companies to develop customer-oriented and competitive products and services to the international market and thus to increase export revenue vital

to the national economy. The aim of the report to renew the know-how, education and training and research in forest-based business and activities in line with the changing needs is a condition for the renewal and future growth of the field. As we aim for bioeconomy, development of business and marketing skills and education relating to it is a high priority. If the efforts of the report do not succeed, the ability of the forest sector to utilise, for example, the growing demand on the export market remains weaker and the bioeconomy market is lost to the competitors.

**We secure the biodiversity of forest nature, ecosystem services and ecological and social sustainability of forests.**

The steering instruments of the Forest Biodiversity Programme for Southern Finland METSO are in a key position. The development of nature management in commercial forests as part of forestry operations has a significant role in securing the biodiversity of commercial forests.

The aim of the report to diversify forest management practices is important in promoting climate change adaptation and securing biodiversity. Measures aimed at climate change mitigation like harvesting of energy wood may also have undesirable impacts on biodiversity. Increased harvesting of energy wood may lead to a decrease in the amount of decaying wood and accelerated endangerment of species, which conflicts with the climate and energy policy objectives. Through closer cooperation in the strategy work of forest-based business and activities and other administrative sectors it is possible to promote the reconciliation of conflicting objectives and avoid potential discrepancies relating to, for example, trade, transport, economic and social policy objectives.

The aim of the report to reinforce the valuation of the use of forests and the forest environment and to enable access to forests to all contributes to reaching the objectives to secure the biodiversity of forests. The acceptability of the different uses and their reconciliation is an important element of social sustainability, which in turn can be promoted through increased cooperation between different actors.

The conditions for securing the biodiversity of forest environments are weakened if the objectives set out in this report are not achieved. This would be detrimental to the acceptability of the management and use of forests, which may lead to disputes on forest issues. The

consequences would be very negative to Finland's international reputation, which is important for both utilising the future growth in ecotourism and in the traditional product market. Thus we would also lose the opportu-

nity to benefit from the new jobs created in ecotourism which will support, in particular, employment in the rural areas.

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## Key terms

<b>Forestry</b>	Denotes roundwood production, forest and nature management and wood harvesting.
<b>Forest industry</b>	Denotes mechanical forest industries (sawmill, board and other wood products) and chemical forest industries (pulp, paper and paperboard).
<b>Forest sector</b>	Comprises forestry and forest industry.
<b>Forest cluster</b>	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.
<b>Forest-based business and activities</b>	In addition to the forest sector, also comprise the production, 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)
<b>Bioeconomy</b>	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.
<b>Forest bioeconomy</b>	Denotes bioeconomy based on forests.
<b>Sustainable forest management</b>	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.
<b>Ecosystem approach</b>	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.
<b>Ecosystem services</b>	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 35 million tonnes of CO<sub>2</sub> equivalent.
- In 2012 the value added of the forest sector was 6.7 billion euros, and its share of the total value added was 4.1%.
- In 2012 the gross stumpage earnings were 1.7 billion euros, of which the share of sawmilling industry was about two-thirds.
- In 2012, the forest industry and forestry employed about 65 000 people, of which about 42 000 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.
- 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 2005–2013

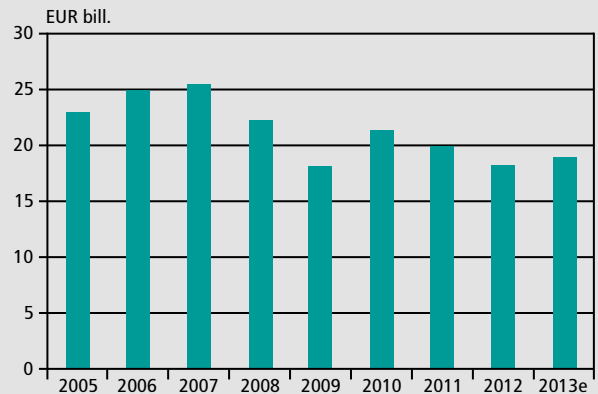


Figure 1. Value of forest industry production in real terms at the price level of 2012, EUR bill. For 2013 an estimate. Source: Statistics Finland.

### Trend in the value of forest and wood products exports in 2006–2013

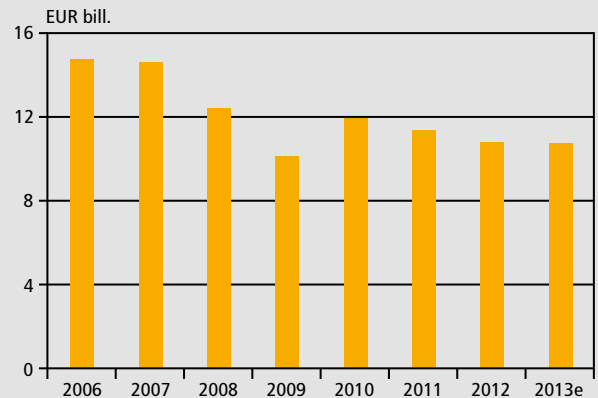


Figure 2. Value of forest industry exports in 2006–2013e in 2012 monetary value (wholesale price index). For 2013 an estimate. Source: Finnish Customs.

### Trend in domestic roundwood removals in 2002–2014e

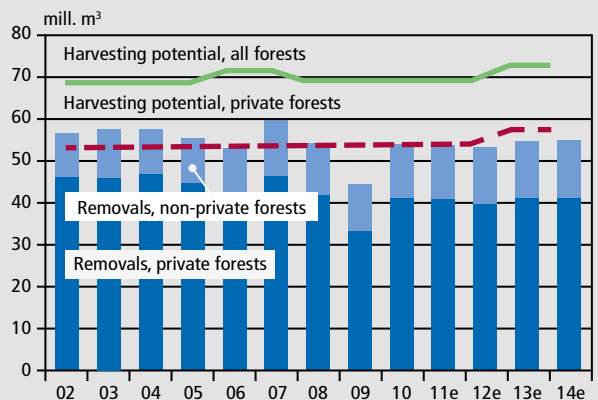


Figure 3. Trend in roundwood removals in 2002–2014e and sustainable harvesting potential. For 2013 and 2014 an estimate. Source: Metla.

### Trend in gross stumpage earnings in 2006–2012

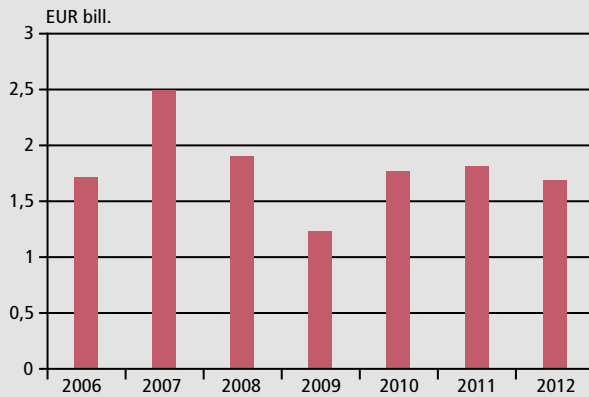
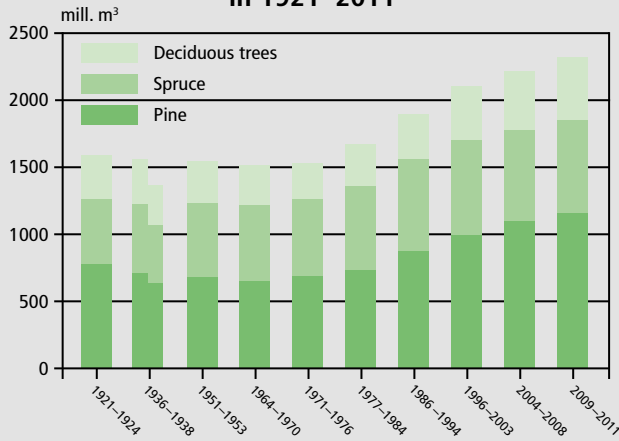


Figure 4. Trend in gross stumpage earnings. Source: Metla.

### Trend in growing stock volumes in 1921–2011



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. Source: Metla, National Forest Inventory.

Figure 5. Growing stock volumes on forest land and poorly productive forest land since the 1920s. Source: Metla.

### Trend in annual increment of growing stock and growing stock drain in 1935–2012

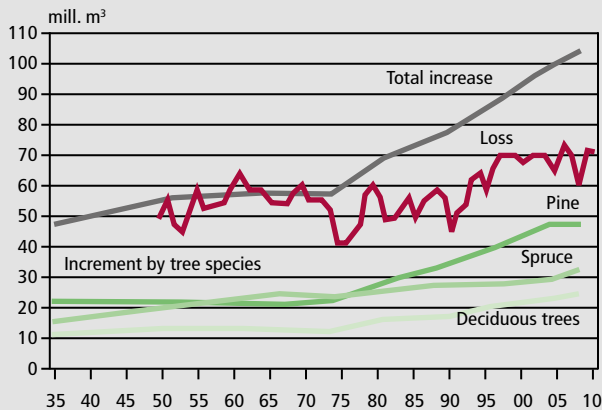
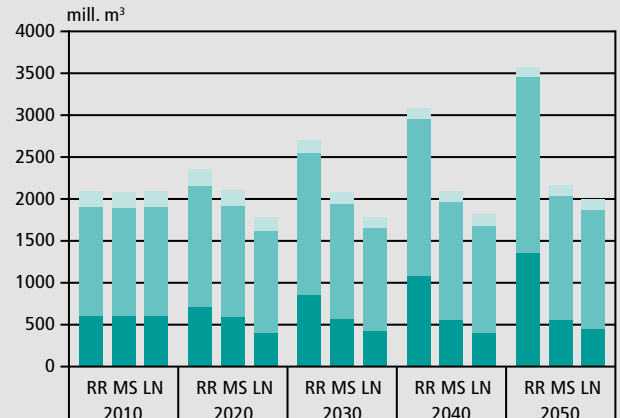


Figure 6. Annual increment of growing stock and growing stock drain in 1935–2012. Source: Metla.

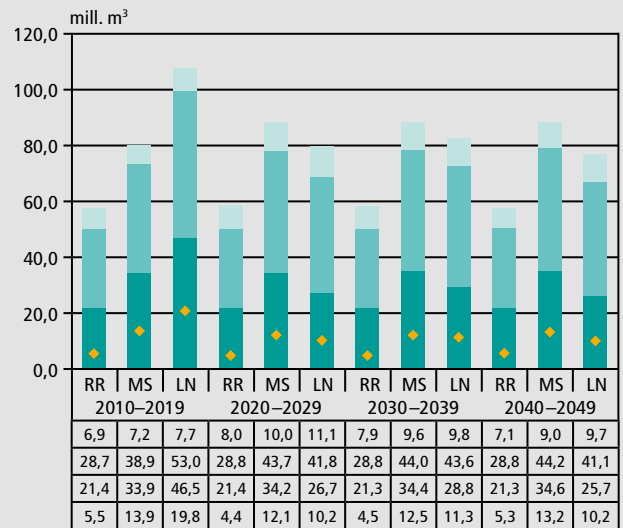
### Trend in volume by roundwood assortments on land available for wood production in different total roundwood removal estimates in 2010–2050



Wastewood  
Fibre  
Logs  
RR=realised total roundwood removals in 2008–2012  
MS=maximum sustainable roundwood removals  
LN=largest net income

Figure 7. Trend in the growing stock volume in different total roundwood removal estimates. Source: Metla.

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



Energy stemwood  
Fibre  
Logs  
Branches and stumps  
RR=realised 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: Metla.



### Share of wood fuels in total energy consumption in 2000–2013e

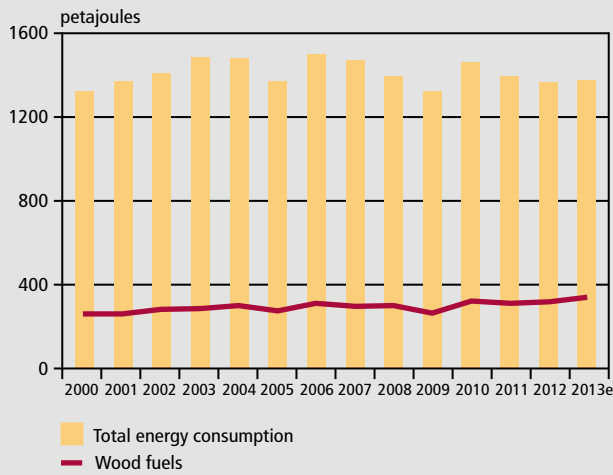


Figure 9. Share of wood fuels in total energy consumption. Preliminary data for 2013 are based on energy consumption data for January–June. Source: Statistics Finland.

### Trend in carbon sequestration and accumulation in forest ecosystems in 2005–2012

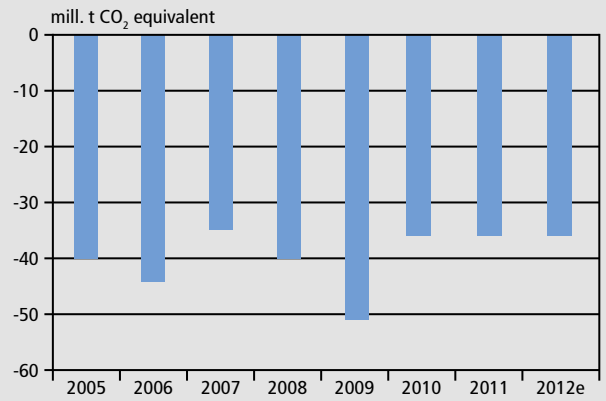


Figure 11. Annual carbon sink of forest stand and soil in 2005–2012e, million tonnes CO<sub>2</sub> equivalent. For 2012 an estimate. Source: Metla.

### Trend in the use of forest chips 2000–2013e

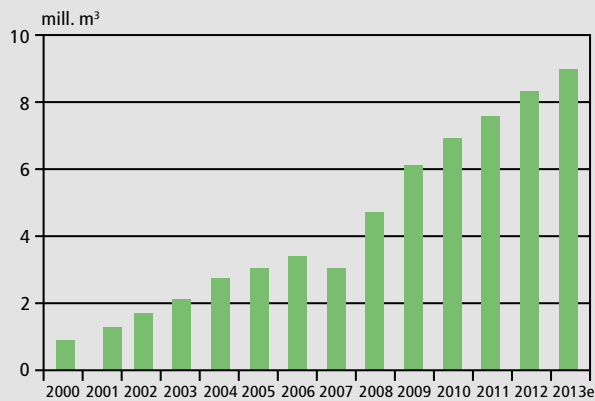


Figure 10. Total use of forest chips in 2000–2013e. The figures include the consumption of forest chips in heating and power plants and small-scale housing. For 2013 an estimate. Source: Metla.

<b>Value of forest-based business, activities and services in 2012, million euros</b>	
Pulp and paper industry, gross value of production <sup>2*</sup>	12 602
Wood product industry, gross value of production <sup>2*</sup>	5 676
Forestry, output at basic price <sup>2*</sup>	4 234
Stumpage money income, gross <sup>2</sup>	1 698
Nature tourism, estimated value added <sup>1</sup> (2006)	~ 800
Energy, garden and environment peat, estimated total turnover <sup>3</sup>	~ 300
Forest chips + fuelwood, value at the place of use <sup>2</sup>	324
Berries, mushrooms and lichen, trade value + estimate of household use, direct sales and sale in open-air market places <sup>2</sup>	~ 220
Game husbandry, calculated value <sup>2</sup>	63
Reindeer husbandry, calculated value <sup>2</sup>	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. <sup>2</sup>	
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: 1. Statistics Finland, 2. Finnish Forest Research Institute, 3. Bioenergy Association of Finland; *preliminary data	

<b>Protected forest land and poorly productive forest land and lands in restricted use 31 December 2008</b>						
	Whole country		Southern Finland		Northern Finland	
	1 000 ha	Share, %	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	100,0	11 294	100,0
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: Finnish Forest Research Institute						



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