Working Papers of the Finnish Forest Research Institute 121

http://www.metla.fi/julkaisut/workingpapers/2009/mwp121.htm
ISBN 978-951-40-2163-3 (PDF)
ISBN 978-951-40-2164-0 (paperback)
ISSN 1795-150X

Policies and Their Implementation Tools Enhancing the Energy Wood Market

A Comparative Case Study of Finland and Slovakia

Daniel Halaj and Ján Ilavský

METLA www.metla.fi

Working Papers of the Finnish Forest Research Institute publishes preliminary research results and conference proceedings.

The papers published in the series are not peer-reviewed.

The papers are published in pdf format on the Internet only.

http://www.metla.fi/julkaisut/workingpapers/
ISSN 1795-150X

Office
P.O. Box 18
FI-01301 Vantaa, Finland
tel. +358 10 2111
fax +358 10 211 2101
e-mail julkaisutoimitus@metla.fi

Publisher
Finnish Forest Research Institute
P.O. Box 18
FI-01301 Vantaa, Finland
tel. +358 10 2111
fax +358 10 211 2101
e-mail info@metla.fi
http://www.metla.fi/

Authors

Halaj, Daniel & Ilavský, Ján

Title

Policies and their implementation tools enhancing the energy wood market. A comparative case study of Finland and Slovakia.

Year	Pages	ISBN	ISSN
2009	87	978-951-40-2163-3 (PDF) 978-951-40-2164-0 (paperback)	1795-150X

Unit / Research programme / Projects

Finnish Forest Research Institute / Joensuu Resarch Unit / 3460 Progress towards the sustainable and competitive forest sector in countries with economies in transition – The consequences for the Finnish forest sector

Accepted by

Timo Karjalainen, Professor, 24.3.2009

Abstract

The aims of the study are to conduct comparative analyses of the forest policies and their provisions supporting the use of forest resources in bioenergy generation, to look into the governments' energy policies and their provisions supporting the use of renewable energy, to analyse the market for energy wood and the barriers hindering its use for energy generation in two selected countries. Finland and Slovakia were chosen for the analysis. The aims of the study also include outlining the specific policy tools and the marketing tools with their activities, which could improve the conditions in the energy wood market. The comparative case study also includes analyses of the barriers and a SWOT analysis of the energy wood market.

The results of the study point out the high indicative targets set by the European Commission for the share of renewable energy sources in the total energy consumption in the studied countries. On the other hand, the National Forest Programmes and the national energy policies in both countries include a number of indicative priorities supporting the utilization of forest biomass. Both countries have adopted several legislative, financial, and other measures supporting the use of biomass for energy generation. Nevertheless, they differ substantially in regard to the level of use of forest-based resources as renewable energy sources. The current share of renewable energy sources in the total energy consumption of Finland is 28%, while in Slovakia it is less than 7%. The results of the SWOT analyses based on the outcomes of several national and international projects point especially to the threat of the global financial crisis and global warming. Moreover, the activities of six marketing tools, specifically of product, price, place, promotion, people and process, were outlined to enhance the energy wood market for three groups of beneficiaries: enterprises, population, and municipalities and institutions.

Keywords

renewable energy, energy wood, policies, marketing tools

Available at

http://www.metla.fi/julkaisut/workingpapers/2009/mwp121.htm

Replaces

Is replaced by

Contact information

Ján Ilavský, Finnish Forest Research Institute, Joensuu Research Unit, P.O. Box 68, FI-80101 Joensuu, Finland. E-mail: jan.ilavsky@metla.fi

Other information

Contents

List of acronyms and abbreviations

AEBIOM	European Biomass Association
CBD	Convention on Biological Diversity
CHP	Combined heat and power
DH	District heat
€	Euro currency
EEA	European Environmental Agency
ERDF	European Regional Development Fund
EREC	European Renewable Energy Council
ESF	European Social Fund
Eubionet	European Bioenergy Network
GDP	Gross Domestic Product
GJ	Gigajoule
ha	hectare
IEA	International Energy Agency
IFF	Intergovernmental Forum on Forests
IPF	Intergovernmental Panel on Forests
m^3	cubic metre
MCPFE	Ministerial Conference on the Protection of Forests in Europe
mill.	million
MJ	Megajoule
MW	Megawatt
MW_e	Megawatt electric
MW_t	Megawatt thermal
NFC	National Forestry Centre
NMS	New Member States
NSRF	National Strategic Reference Framework
OECD	Organisation for Economic Cooperation and Development
OPC&EG	Operational Programme Competitiveness and Economic Growth
PJ	Petajoule
RES	Renewable energy source
RES-H&C	Renewable Heating and Cooling
RES-E	Renewable Electricity
RMS	Regional Marketing Strategy
SWOT	Strengths, Weaknesses, Opportunities, Threats
SKK	Slovak Crowns
t	tonne
TAFFEC	Trade Association of Finnish Forestry and Earth Moving Contractors
ths.	Thousands
u.b.	under bark
UN	United Nations
UN FCCC	Convention on Climate Change
UNFF	UN Forum on Forests agenda
VTT	Technical Research Centre of Finland
CEN/TC	European Committee for Standardization

Definitions

Gigajoule (GJ)	Unit referring to heat, 1 TJ = 1 000 GJ, 1 PJ = 1 000 TJ
Megawatt hour (MWh)	Unit referring to electricity, 1 MWh = 3.6 GJ, 1 TWh = 1000 GWh
1 m^3 solid	Unit referring to wood as solid cubic metre, ≈ 2.5 m^3 loose
1 m^3 loose	Unit referring to wood as loose cubic metre, ≈ 0.4 m^3 solid
Available potential of biomass	Technical potential of biomass decreased due to legislative barriers and inbuilt infrastructure.
Bioenergy	Bioenergy refers to energy derived from biofuels.
Biomass	Refers to the biodegradable fraction of products, waste and residues from agriculture (including plant and animal substances) and forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.
Biofuel	(= biomass fuel) Fuel produced directly or indirectly from biomass. The said fuel may have undergone mechanical, chemical or biological processing or conversion or it may have been used previously. Biofuel refers to solid, gaseous and liquid biomass-derived fuels.
Black liquor	Alkaline spent liquor obtained from digesters in the production of sulphate or soda pulp during the process of paper production in which the energy content mainly originates from the content of the lignin removed from the wood in the pulping process.
CHP	Combined Heat and Power (CHP), or cogeneration, is defined as an energy conversion process in which electricity and useful heat are produced simultaneously in a single process. CHP is generated by several types of CHP plants, such as conventional backpressure power plants, extraction-condensing power plants, gas-turbine heat-recovery boiler plants, combined-cycle power plants, and reciprocating-engine power plants.
DH	Distribution of thermal energy in the form of steam, hot water, from a central source of production through a network to multiple buildings for use in heating spaces or processes
Economic potential of biomass	Useful potential of biomass decreased due to economical assessment.
Final consumption of energy	Energy commodities delivered for energy purposes to manufacturing industry, transport, households, services, agriculture, forestry and fisheries, including the consumption of electricity and heat by the energy branch for electricity and heat production, and including the losses of electricity and heat in distribution.
Firewood	Cut and split oven-ready fuel wood used in household wood-burning appliances such as stoves, fireplaces, and central heating systems. Firewood usually has a uniform length, typically in the range of 150 mm to 500 mm.
Forest chips	Forest wood in the form of wood chips
Forest fuel	Wood fuel produced where the raw material has not been used previously. Forest fuel is taken from the forest and processed directly for energy use. Forest fuels can be fuels from logging.
Forest residues	Woody residues consisting of branches, tree tops, brushwood and small trees not harvested or removed from logging sites in commercial wood stands, as well as material resulting from forest management operations.
Fuel wood; energy wood	Wood fuel where the original composition of wood is preserved.
Guarantee of origin	Means an electronic document which has the function of providing proof that a given quantity of energy was produced from renewable sources.
Log wood	Cut fuel wood, in which most of the material has a length of 500 mm or more.
Logging residues	Woody biomass residues created during harvesting of merchantable timber. Logging residues include tree tops with branches and this material can be salvaged fresh or after seasoning.
Market potential of biomass	Economic potential of biomass decreased due to investment assessment of biomass utilization for potential investors.

Peat	Peat is a material formed by decomposition of dead plant parts under very moist conditions. Peat material is, thus, of biological origin. It is continuously formed in wetlands and decomposed in varying degrees by biological and chemical processes with limited oxygen access. In Finland, peat is a local, indigenous, solid fuel, which is used as milled or sod peat.
Pellet	Fuel in the form of short cylindrical or spherical units. Pellets are usually 8 – 12 mm in diameter and 10 – 30 mm in length, with a moisture content of less than 10%. Wood pellets are usually produced from cutter shavings, dried sawdust and powder.
Pyrolysis oil	Liquid biofuel, which is produced in fast pyrolysis by heating wood (moisture content less than 10%) up to 500 – 600 °C in a very short time. The organic particles are transformed into gas which is then converted into a liquid (oil). Generally, the bio-oil yield is about 70 w-%.
Recycled wood fuels	Recycled wood fuels include post-society wood fuels like demolition wood, wood casings and other waste wood.
Refined fuel	Biofuel that has been treated mechanically or chemically to homogenise its properties; e.g. pellets, briquettes and pyrolysis oil are refined fuels.
Renewable energy obligation	Means a national support scheme requiring energy producers to include a given proportion of energy from renewable sources in their production, requiring energy suppliers to include a given proportion of energy from renewable sources in their supply or requiring energy consumers to include a given proportion of energy from renewable sources in their consumption.
Renewable energy sources (RES)	Refers to renewable non-fossil sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogas).
Sawdust	Fine particles created when sawing wood. Most of the material has a typical particle length of 1 to 5 mm.
Support scheme	Means a scheme, originating from a market intervention by a Member State, that helps energy from renewable sources to find a market by reducing the cost of production of this energy, increasing the price at which it can be sold, or increasing, by means of a renewable energy obligation or otherwise, the volume of such energy purchased.
Technical potential of biomass	Part of total potential of biomass which can be used after implementation of available technology.
Total potential of biomass	Renewable energy source that can be changed into other energy forms in one year and its amount is determined by natural conditions.
Wood fuels, wood-based fuels, wood-derived biofuels	All types of biofuels originating directly or indirectly from woody biomass. See also fuelwood, forest fuels, and black liquor.
Woody biomass	The trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment, and which are the by-products of forest management, forest restoration, forest health and hazardous-fuel reduction treatments.
Woody Biomass Utilization	The harvest, sale, offer, trade, and/or utilization of woody biomass to produce the full range of biobased products and bioenergy, including sawn goods, composites, paper and pulp, furniture, housing components, round wood, ethanol, chemicals, and energy feedstocks.

Acknowledgements

Ing. Daniel Halaj, PhD, researcher of the Technical University in Zvolen, Slovakia, would like to make a grateful acknowledgement to CIMO, The Finnish Centre for International Mobility and to The Ministry of Education of the Slovak Republic for a scholarship which allowed him to participate in the research on conducting the study. He would also like to acknowledge Dr. Jari Parviainen, the Director of The Finnish Forest Research Institute, Joensuu Research Unit (Metla), for acceptance of his scholarship and for an excellent and motivating working environment during the stay in Joensuu.

Authors of the study would like to acknowledge great help of all colleagues from the research groups on Forest Technology and on International Forestry in Metla by providing information and consultations and to Professor Timo Karjalainen, Professor Antti Asikainen, and Professor Pekka Ollonqvist for their valuable comments and proposals for improvement of the study.

1 Introduction

Since the early 1990's, most parts of the world have been enjoying an unprecedented period of economic growth. Since 1994, the global oil consumption has increased by 20%, and it is projected by the International Energy Agency (IEA) to grow by 1.6% per year. According to the IEA, the world's energy demand is set to increase by more than 60% by 2030. Meeting this demand requires an investment in the energy sector which is estimated to amount to USD 16 trillion over the next 25 years. The business-as-usual investment scenario would not only create a significant financing challenge, but it would not lead to a sustainable future, in particular as regards greenhouse gas emissions, air quality, poverty, sustainable management of natural resources, and energy security (The Global Energy Efficiency and Renewable Energy Fund, 2006).

The need to ensure sustainable development, i.e. to simultaneously win the battle against climate change, eradicate energy poverty, and secure global energy supplies, calls for profound changes in the way energy services are delivered and energy sources are used.

According to the IEA's alternative energy scenarios, increased reliance on energy efficiency and renewable energy could reduce the growth of global energy demand from over 60% to 50%, and that of global emissions from 62% to 46%. Reduced future demand could lead to a 15% reduction in the price of oil. While this would still not resolve the issues set out above, it would be a significant step in the right direction. The European Commission has estimated that in the long-term, energy-efficiency improvements and renewable energy can enable cost-efficiently up to 2/3 of the emission reductions (SEC(2005)180).

As a result of the broad range of public benefits, policy frameworks are improving and renewable energy and energy efficiency now constitute an integral part of the core energy and development investment agendas.

Increased exploitation of renewable energy sources contributes to the mitigation of climate change through the reduction of greenhouse gas emissions, by promoting sustainable development, by enabling the security of energy supply and the development of a knowledge-based industry, and thereby bringing about new jobs, economic growth, competitiveness, and regional and rural development.

Biomass is one of the most important and promising renewable energy sources. Forest biomass, including short-rotation and fast-growing energy plantations, harvesting residues, wood-processing residues, and recovered wood, represent resources, which can significantly contribute to the amount of energy produced from renewable resources. Sustainable forest management practices and enlargement of forest areas in Europe have resulted in greater availability of forest resources, which can be made use of while respecting the principles of sustainable forest management. However, also the needs and economic viability of traditional wood-processing industries have to be taken into account if we are to avoid situations characterised by undesirable competition and market distortion.

The importance of the use of biomass for energy has been recognized as an important topic for the forest sector by the 5th Ministerial Conference on the Protection of Forests in Europe in November 2007 in Warsaw, Poland. In adopted Warsaw Resolution ministers responsible for the forest sector committed themselves to enhance the role of the forest sector in energy production and in mobilization of wood resources by identifying and removing unintended barriers, adjusting policies and instruments supporting the production and distribution of bio-energy, increased mobilization, efficient use of wood and energy.

Climate change and the vital role of forests in its mitigation constitute important challenges to the forest sector. The increasing demand for wood by the traditional forest-based industries and as a source of renewable energy demands a response in regard to the principles of sustainable forest management and the criteria for sustainable biomass production. Even more challenges are produced by the recent global financial crisis and its impact on the timber products markets. Therefore, precise analysis of the market situation with respect to wood and timber products and the marketing tools used in enhancing it are very important for ensuring the economic sustainability of the forest sector.

This study focuses on analysis of policies and marketing tools for the utilization of wood as a source of renewable energy. Firstly, the policies and instruments for their implementation adopted at the level of the European Union are summarized to provide the basic framework conditions, which have to be implemented into each EU Member State's policy documents. Following this, we proceed to analyse the country level policies and instruments.

We selected two countries for these analyses, namely Finland and Slovakia. These countries were chosen because of some similarities, e.g. their populations are the same, they have long-standing traditions in the forest sector, high forest cover percentages. On the other hand, they differ substantially in regard to the level of use of forest-based resources as a renewable energy source. The current share of renewable energy sources in the total energy consumption in Finland is 28.5%, while in the case of Slovakia it is only 6.7%. The aims of the present study are to compare the forest policies and their provisions supporting the use of forest resources in bioenergy production, to look into the governments' energy policies and their provisions supporting the use of renewable energy. The aim of the study is also to outline the specific policy tools and the marketing tools with their activities, which could improve the market conditions in the two countries.

2 The basic characteristics of forestry in the studied countries

2.1 The basic characteristics of Finnish forestry

Forestry land (forest land, scrub land, and waste land, and roads and depots) covers 26.3 million hectares. The area of forest land (forests and scrub land) amounts to 22.9 million hectares, which account for 67.7% of the total land area of Finland. The areas of protected forests and forests under restricted forestry use amount to 12.6% of the total land area. More than 85% of these areas are in Northern Finland. The share of different forest categories is shown in Figure 1.

The tree species composition is not very diverse. Coniferous stands cover approximately 89.3% of the forest land area, broadleaved stands only 9.5%, and the temporarily non-stocked area accounts for 1.2%. The highest proportion in the tree species composition goes to pine with 65.5%. The current tree species composition is shown in Figure 2.

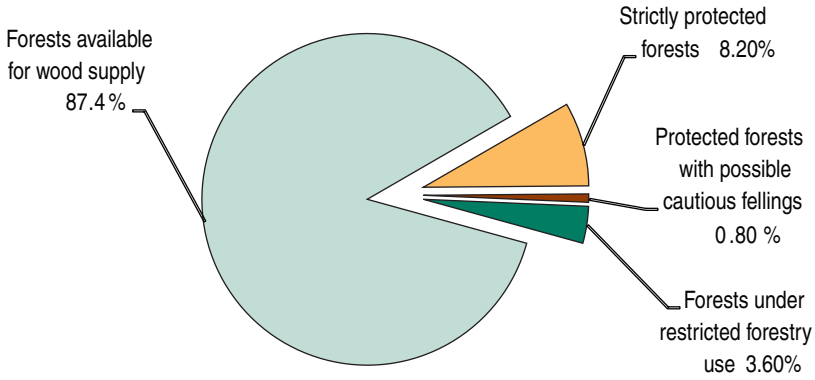

Figure 1. Share of forest categories, 2006.
Source: Finnish Statistical Yearbook of Forestry 2007, Metla

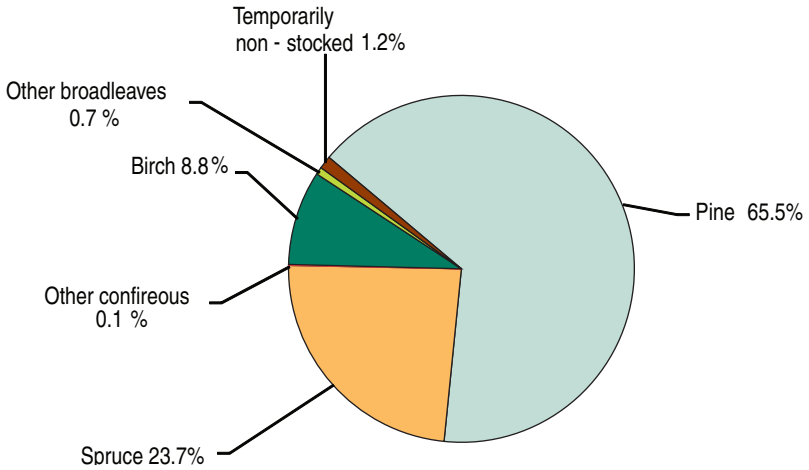

Figure 2. Present tree species composition of forest stands.
Source: Finnish Statistical Yearbook of Forestry 2007, Metla

Forest ownership is distributed among several groups (Figure 3). The majority of the forests are owned by about 900,000 private families. The majority of forest owners live in the same region as where their forests are located. Private individuals own 59% of the forest land, the State owns 25%, forest-industry companies own slightly less than 10%, and the remainder is owned by municipalities, parishes and foundations, or groups of collective owners. Ownership by pensioners and wage earners has increased, while the farmers' share has decreased markedly since the 1990's. The average private individual owner is 59 years of age. Four fifths of stumpage earnings remain in the locality where the forest holding is located. Harvesting, transportation and silviculture are important source of income in rural areas. Along with their value as recreation, wild-berry collecting and hunting, also posses economic value for the rural population. Forests are, therefore, a central factor in maintaining the viability of the countryside and balanced regional development.

The total growing stock on forest land and scrub land has been continually increasing since 1964 (Figure 4). In 2004-2006 it reached 2.189 billion m^3. This is mainly caused by the high proportion of 20-60-year-old stands (Figure 5). The mean growing stock per hectare is 105 m^3.

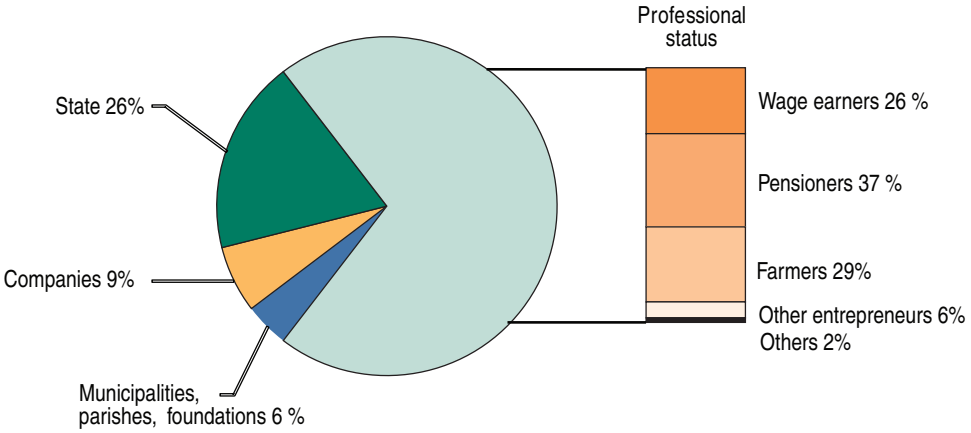

Figure 3. Forest ownership 2006, % of forest land.
Source: Finland's National Forest Programme 2015, 3b 2008; Data for non-industrial private forest owners are from 2003

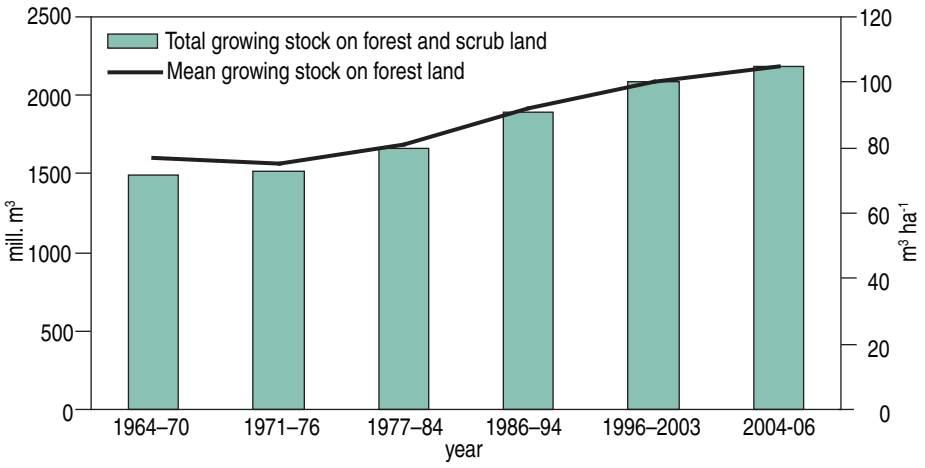

Figure 4. Development of the total growing stock and mean growing stock.
Source: Finnish Statistical Yearbook of Forestry 2007, Metla

The forests in Finland have mostly been regenerated artificially. Artificial regeneration has, on average, remained unchanged over the years. The area treated with artificial regeneration represented 119,000 ha in 2006. On the other hand, the area left to regenerate naturally decreased from 30% in 2000 to 18% in 2006 (Figure 6).

In 2006, removals reached 56.94 million m^3, which is 3% less than in 2005. The total roundwood removals decreased in three years (2004-2006) by more than 7% or 4.22 million m^3 (Figure 7).

The export of roundwood and wood residues is increasing. The increase has been more than 55% when comparing to the situation in 2000. In 2006, the export of roundwood decreased more than 5% when compared to 2005 and reached 1.413 million m^3 (Figure 8).

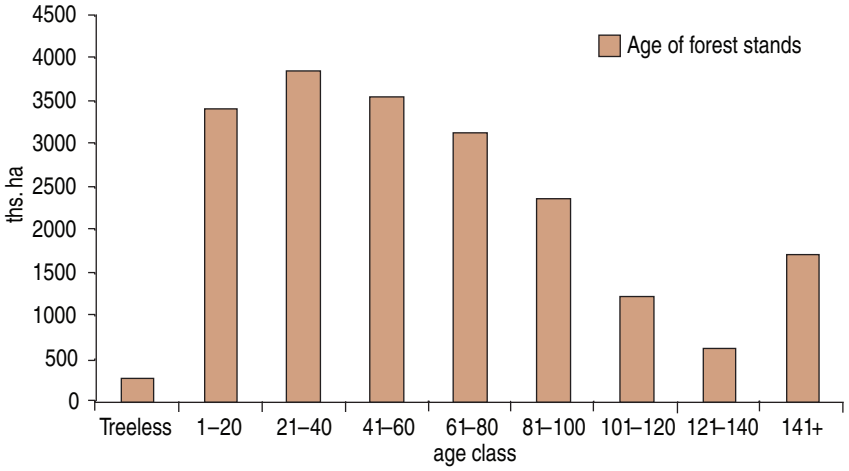

Figure 5. Age structure of forests in Finland.
Source: Finnish Statistical Yearbook of Forestry 2007, Metla

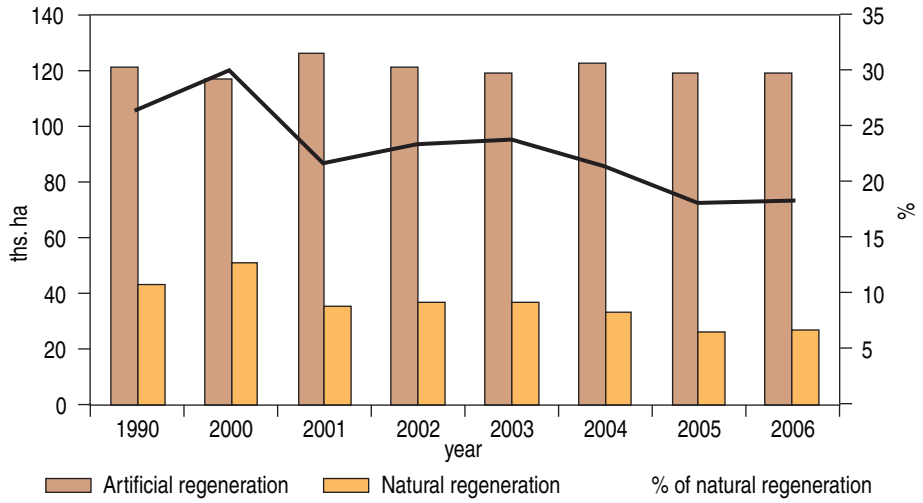

Figure 6. Development of areas treated with artificial and natural forest regeneration.
Source: Finnish Statistical Yearbook of Forestry 2007, Metla

The import of roundwood have been increasing since 2000, the exception being 2006 (19.993 million m^3) when import decreased by more than 7% in comparison to 2005. The development of roundwood import shows an increase of more than 54% from 2000 to 2006 (Figure 9).

The share of forestry in the Finnish economy reached 1.8% in 2006 (2.589 billion €). The total production of the wood-processing industries, which means wood-products industries and pulp and paper industries, reached the value of 5.515 billion €, which amounted to 3.8% of the gross domestic product (GDP). The share of forestry and the wood-processing industries was 5.6% of the GDP in 2006.

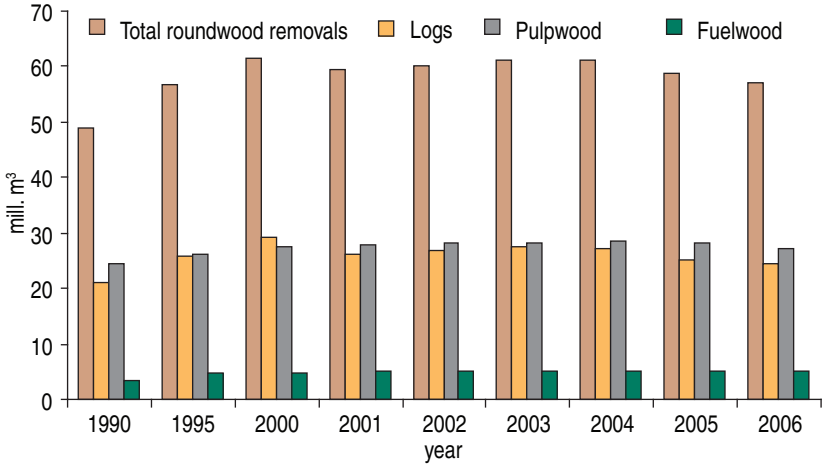

Figure 7. Roundwood removals.

Source: Finnish Statistical Yearbook of Forestry 2007, Metla

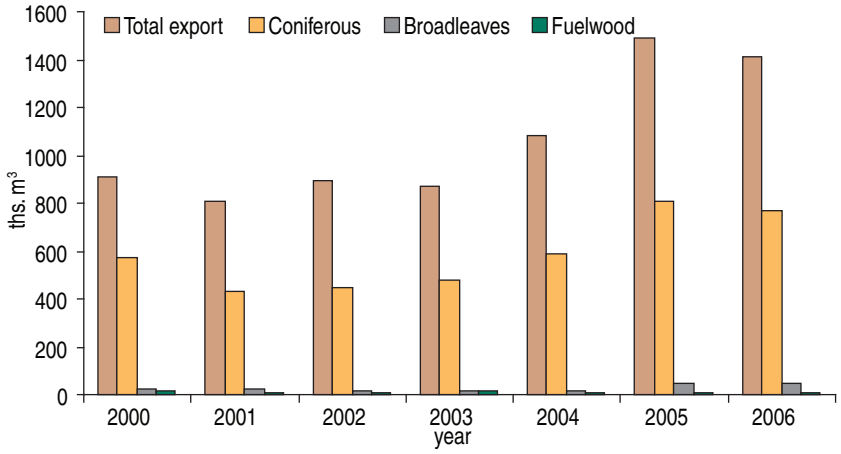

Figure 8. Export of roundwood and wood residues.

Source: Finnish Statistical Yearbook of Forestry 2007, Metla

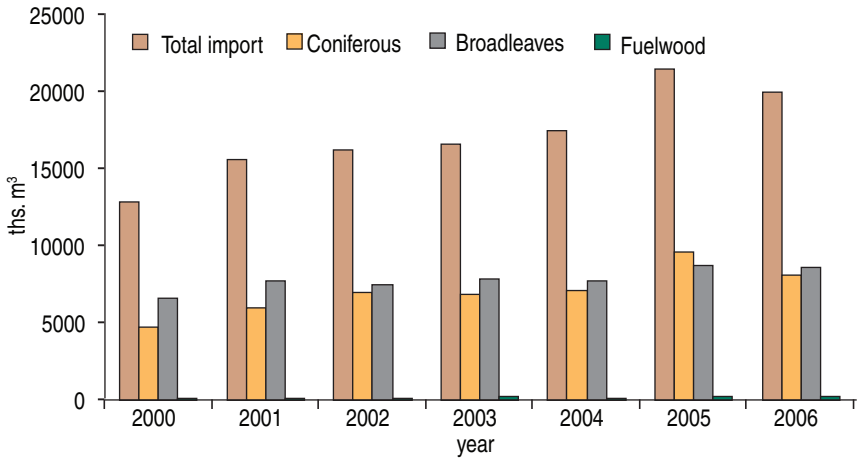

Figure 9. Import of roundwood and wood residues.

Source: Finnish Statistical Yearbook of Forestry 2007, Metla

2.2 The basic characteristics of Slovakian forestry

Slovakia's forest land area was 2 million hectares in 2007. Forest stands cover 1.9 million hectares, which account for 41% of the total area of the country (Figure 10).

The proportion of commercial forests is 68.2%, that of protection forests 17%, and that of special-purpose forests 14.8%. The development of the proportions of these forest categories during the period 1980-2007 is shown in Figure 11.

Forest ecosystems are dominant and extremely valuable components of the especially protected territories. Their total area is 1,135,270 ha, including protective zones, which represents 23.2% of Slovakia's land area. The total forest cover on protected sites as per the 2nd to 5th degree of the IUCN scale of protection is 72.6%. At present, the national system of protected territories consists of nine national parks, fourteen protected landscape areas, and 701 small-in-area protected territories.

There are a variety of tree species forming the composition of forests in Slovakia (Figure 12). Increasing biological diversity is having a positive influence on forest stability. Coniferous stands cover approximately 30.5% of the forest land area, broadleaved stands cover 49.9%, mixed stands cover 19%, and unstocked areas account for 0.6%. The two most common tree species are beech, which covers 31.2% and spruce, which cover 25.9% of the forest land area.

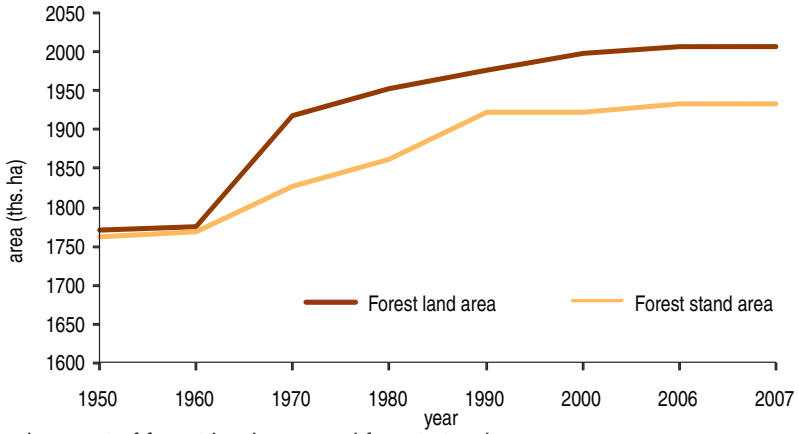

Figure 10. Development of forest land area and forest stand area.
Source: Green Report, 2008

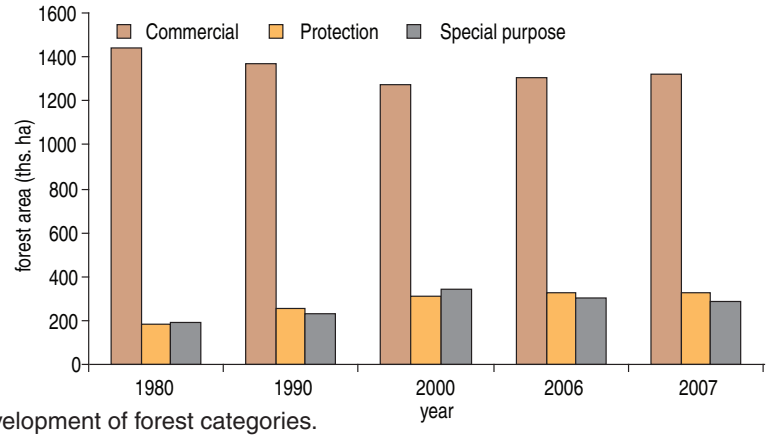

Figure 11. Development of forest categories.
Source: Green Report, 2008

The arrangement of forest ownership in accordance with the Restitution Acts has not yet been completed (Figure 13) on the part of small-scale private ownership due to legislative, technical, and economic obstacles.

The growing stock has been steadily increasing (Figure 14) and in 2007 it reached 445.9 million m^3 u.b. This increase is mainly the result of the higher proportion of 50–90-year-old stands (Figure 15), the change in the methodology of calculating the growing stock, and the application of new growth tables. The mean growing stock per hectare is 232 m^3.

The proportion of natural regeneration has increased from less than 10% in 1991–2000 to 40.5 % in 2006 as a result of the application of the shelterwood method. In 2007, the proportion of natural regeneration decreased to 34.1% (Figure 16).

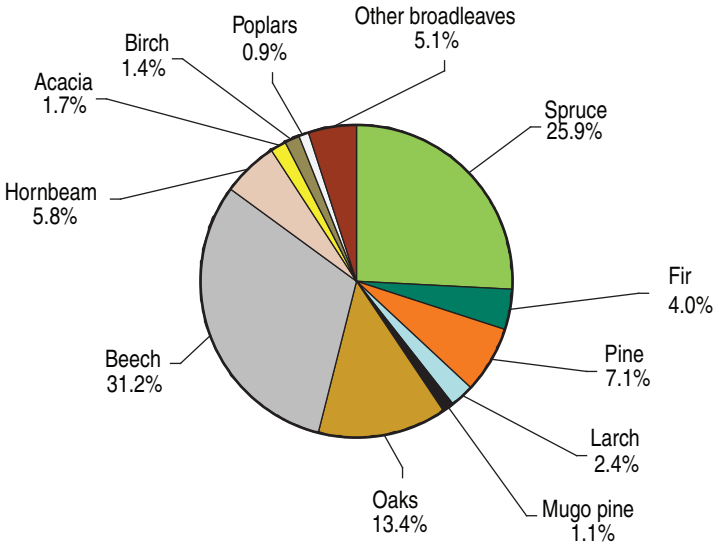

Figure 12. Current tree species composition.
Source: Green Report, 2008

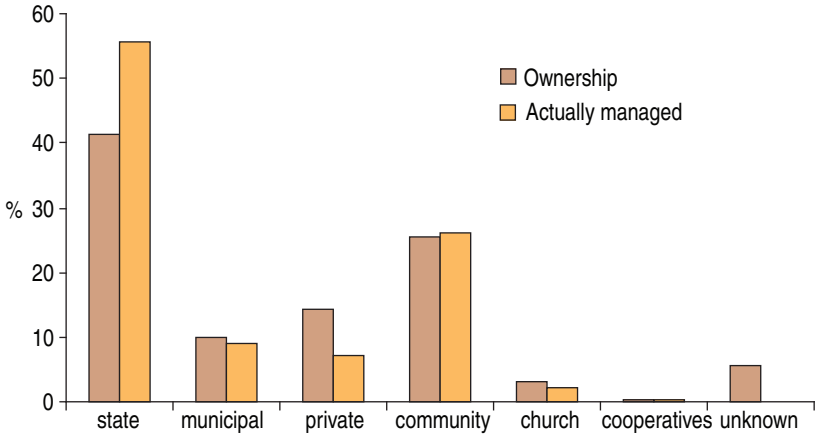

Figure 13. Current state of forest ownership and forest use.
Source: Green Report, 2008

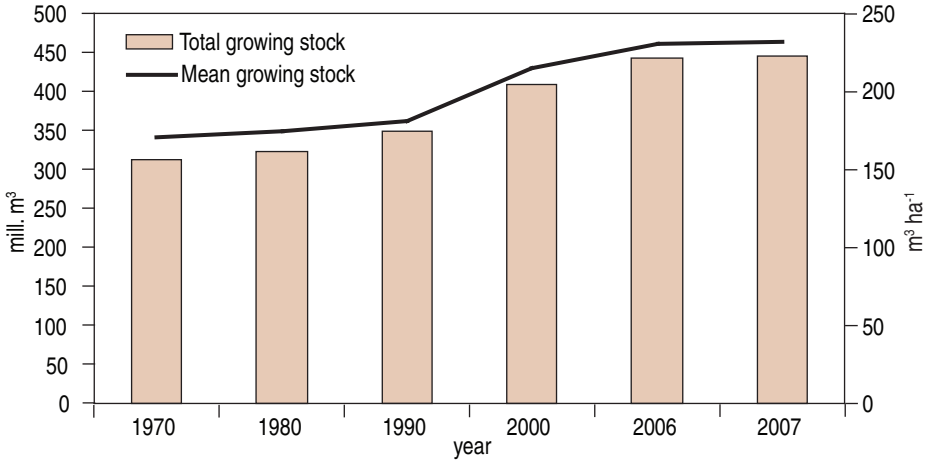

Figure 14. Development of the total growing stock and the mean growing stock.
Source: Green Report, 2008

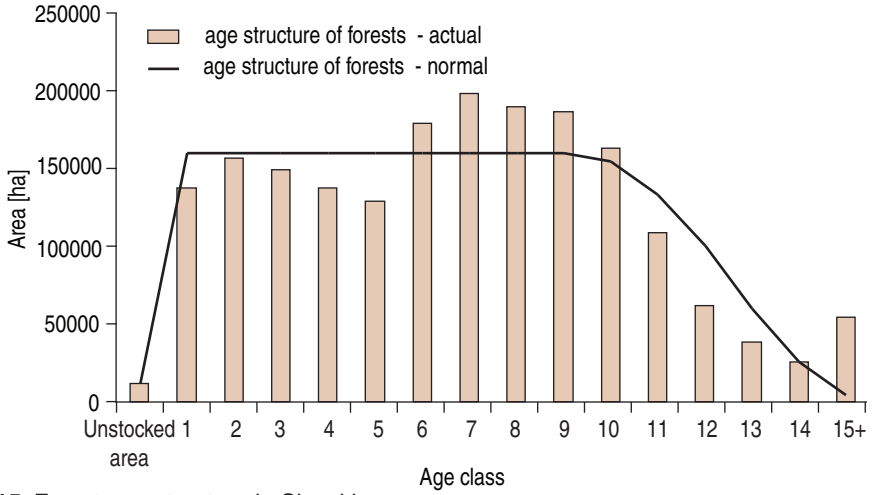

Figure 15. Forest age structure in Slovakia.
Source: Green Report, 2008

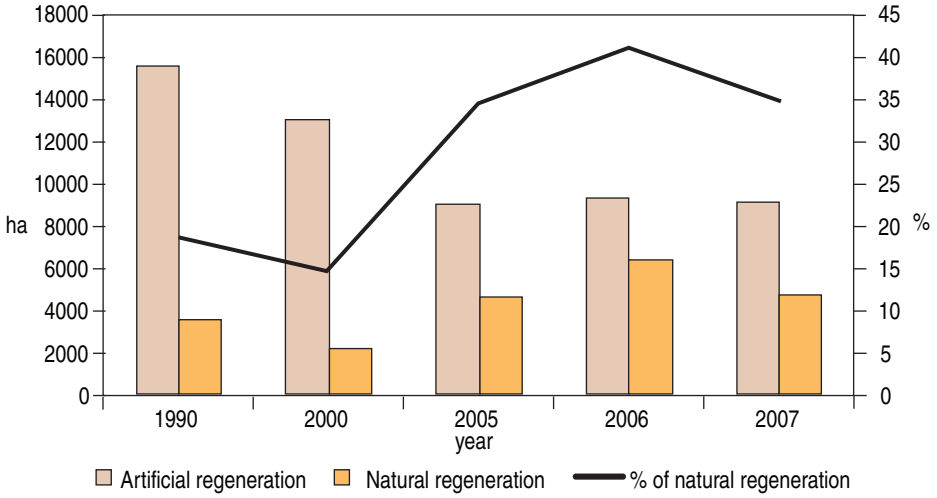

Figure 16. Development of forest regeneration area.
Source: Green Report, 2008

Annual fellings have increased during the past few years (Figure 17); the figure was 6.2 million m^3 in 2000, over 6.6 million m^3 in 2003, over 7.2 million m^3 in 2004, and 10.2 million m^3 in 2005, which is the all-time record in the history of Slovakian forestry. It was the outcome of processing of wood salvaged from storm-damaged forests in November 2004. In 2007 8.3 million m^3 were harvested, which was 18.63% less than in 2005. The annual planned harvest volume was exceeded due to the high rate of accidental felling caused by the unsatisfactory state of health of the forests due to high level of air pollution; this particularly impacts on spruce-dominated coniferous stands.

Removals reached 7.847 million m^3 in 2007. This amount includes completion of accidental felling in the forests damaged by the storm in 2004 (Figure 18).

The selling of roundwood is the most important (80%) source of revenue in the forestry sector. The export of roundwood from Slovakia decreased in 2000 – 2004. Due to the availability of large amounts of roundwood from storm-damaged forests, export in 2005 slightly increased to 1.815 million m^3. In 2007, the export of roundwood increased by more than 24% in comparison to 2006, and reached 1.533 million m^3 (Figure 19). The import of roundwood is not very significant varying between 0.2 million m^3 and 0.4 million m^3 during the past few years (Figure 20).

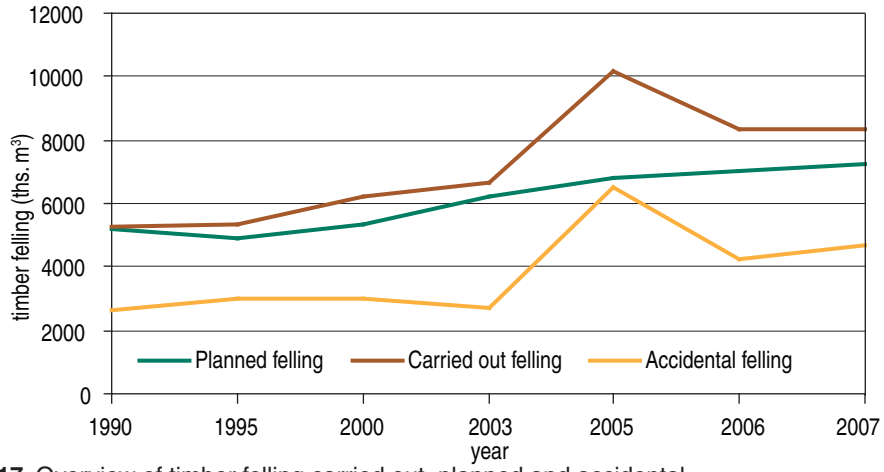

Figure 17. Overview of timber felling carried out, planned and accidental.
Source: Green Report, 2008

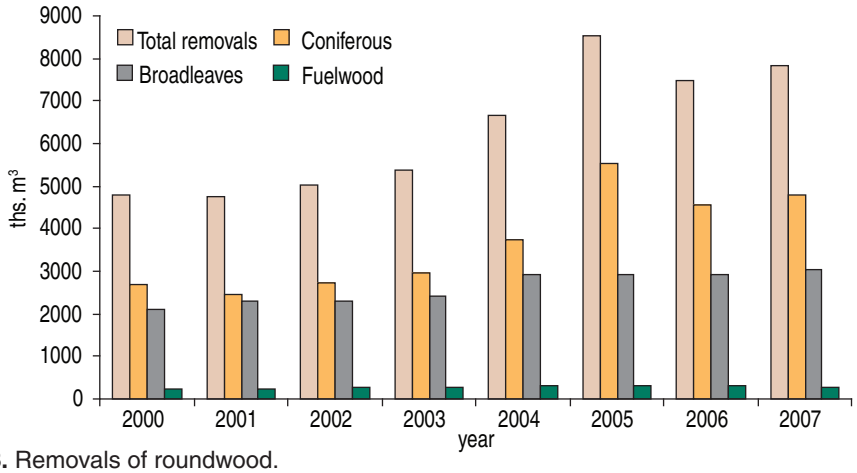

Figure 18. Removals of roundwood.
Source: Green Report, 2008

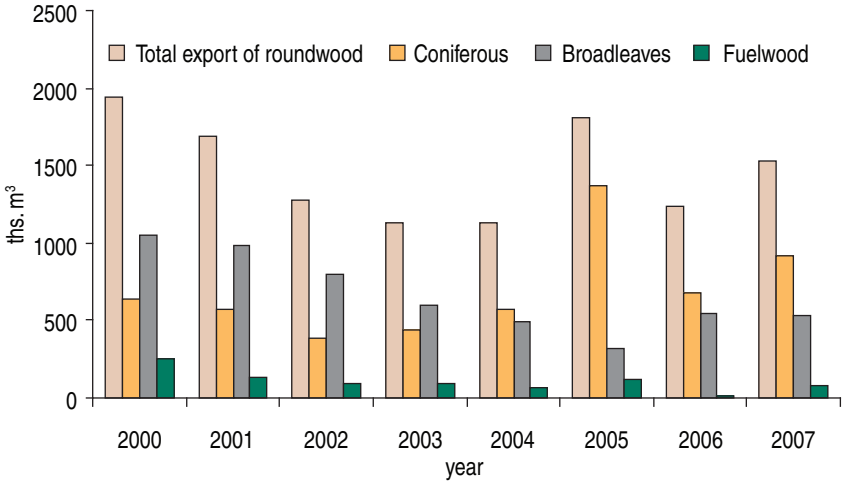

Figure 19. Export of roundwood.
Source: Green Report, 2008

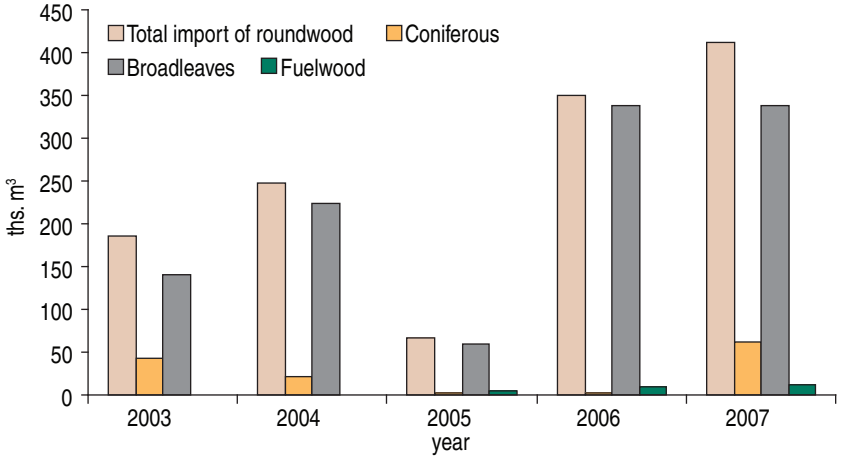

Figure 20. Import of roundwood.
Source: Green Report, 2008

The proportion of forestry in the economy of Slovakia reached 0.46% in 2007 (282.1 million euros). Domestic timber production in the wood-processing industries reached the value of 720.3 million euros, which is 1.2% of the GDP. The combined proportion of forestry and the wood-processing industries was 1.66% of the GDP in 2007.

BOX 1

Overview of the basic forestry data of Finland and Slovakia

	Finland		Slovakia	
Total area	33.8 mill. ha		4.9 mill. ha	
of which water area	3.4 mill. ha		0.09 mill. ha	
Forest land area	26.3 mill. ha		2.0 mill. ha	
Protected forests area	2.8 mill. ha		0.3 mill. ha	
Forest ownership	Municipalities. parishes. foundations:	6%	Municipalities:	9.8%
	State:	9%	State:	41.4%
	Companies:	26%	Non-industrial private:	14.3%
	Non-industrial private:		Communities:	25.5%
	Wage earners	26%	Church:	3.2%
	Pensioners	37%	Cooperatives:	0.2%
	Farmers	29%	Unknown:	5.6%
	Other entrepreneurs	6%		
	Others	2%		
Tree species	Pine:	65.5%	Pine:	7.1%
	Spruce:	23.7%	Spruce:	25.9%
	Other conifers:	0.1%	Fir:	4%
	Birch:	8.8%	Larch:	2.4%
	Other broadleaves:	0.7%	Mugo pine:	1.1%
			Oaks:	13.4%
			Beech:	31.2%
			Hornbeam:	5.8%
			Acacia:	1.7%
			Birch:	1.4%
			Poplars:	0.9%
			Other broadleaves:	5.1%
Total growing stock:	2 189 mill. m^3		445.9 mill. m^3	
Mean growing stock:	105 $m^3.ha^{-1}$		232 $m^3.ha^{-1}$	
Total annual increment:	98.5 mill. m^3		11.6 mill. m^3	
Mean annual increment:	4.3 $m^3.ha^{-1}$		6.1 $m^3.ha^{-1}$	
Roundwood removals:	56.9 mill. m^3		7.8 mill. m^3	
Import of roundwood:	19.9 mill. m^3		0.412 mill. m^3	
Export of roundwood:	1.4 mill. m^3		1.5 mill. m^3	
Proportion of GDP:	1.8%		0.46%	

Sources: Green Report, 2008; Finnish Statistical Yearbook of Forestry, Metla, 2007

3 Analysis of the state policies for the forest sector related to the use of forest resources for energy generation

This analysis of the objectives and priorities of state policies for the forest sector is based on an analysis of the National Forest Programmes of Finland and Slovakia, EU Directives, and the EU Forest Action Plan.

The international discussion on National Forest Programmes (NFP) began in 1992 at the United Nations (UN) Conference on Environment and Development. This discussion has continued under the auspices of the Intergovernmental Panel on Forests (IPF), the Intergovernmental Forum on Forests (IFF), and currently it occupies an important position on the agenda of the UN Forum on Forests (UNFF).

The framework for supporting sustainable forest management within the European Union (EU) was created in 1998 with the adopting of the Resolution on Forest Strategy for the EU. It took into account the commitments adopted by the EU and by its Member States within relevant international processes and at the Ministerial Conferences on the Protection of Forests in Europe. The Forest Strategy highlighted the importance of the multi-functional aspects of forests, of supporting the sustainable management of forests to promote societal development, and its implementation via National Forest Programmes.

In the course of the preparation of the EU Forest Action Plan, the Commission and the Member States have developed a common vision of forestry; it is called Forests for Society – long-term multifunctional forestry fulfilling present and future societal needs. Forestry in the EU is perceived as being part of rural development and in accordance with the aforementioned vision the following main objectives have been defined:

- To improve the long-term competitiveness of the forest sector and to enhance the sustainable use of forest products and services (the economic objective).
- To maintain and appropriately enhance biodiversity, carbon sequestration, integrity, health and resilience of forest ecosystems (the ecological objective).
- To contribute to the quality of life by preserving and improving the social and cultural dimensions of forests (the social objective).

At present, the NFP concept is an important tool helping to achieve sustainable forest management in a way that respects national sovereignty and complies with specific national conditions. A common approach of the European countries to National Forest Programmes was agreed at the Ministerial Conference on the Protection of Forests in Europe (MCPFE) held in Vienna in 2003 (Resolution VI).

Five years after the adopting of the EU Forest Strategy, the European Commission elaborated a report on its implementation based on consultations with the Member States and stakeholders. The report describes the National Forest Programmes as being tools for the Member States with which to implement a cross-sectoral approach to forest policy.

3.1 Finland's National Forest Programme 2015

The basic policy document for the forest sector is Finland's National Forest Programme (NFP) 2015 adopted as a Government Resolution on 28 February 2008. It aims to increase the wellbeing of Finnish citizens through the diverse use of forests in compliance with the principles of sustainable development. The programme was drawn up involving broad-based collaboration with interest groups steered by the Department of Forestry of the Ministry of Agriculture and Forestry with support from the National Forest Council. The underlying idea of the programme is that forest-based manufacturing and service production can be expanded while securing the social acceptability, economic viability, and ecological, social and cultural sustainability of the forest sector. As production in the forest sector must be market-oriented and based on customer needs, the private sector has a vital role to play. It is the task of the public sector to create such preconditions that forests can be managed competitively.

The purpose of the National Forest Programme is to *add to people's wellbeing through having diverse forests*. The vision, or target state, of the programme is set for 2015, when *Finland is expected to be a pioneer country in sustainable forest management, when the competence of the sector has been refined into new competitive products and services, when the use of domestic wood has increased significantly, and when forest biodiversity has improved.*

Finland's National Forest Programme 2015 is based on six priorities. Each priority has its own objectives and the measures to achieve them have been proposed (Box 2).

The measures referred to are the responsibility of the public sector, the private sector or the two together. The public sector is responsible for creating proper operating conditions for the forest sector. The means for this include legislation, operative and financial planning and budgeting, performance-based management, consultation, and communication. Development measures with the aim of improving the productivity of the national economy within national and local government and sectoral research will all be taken into consideration in the implementation of the programme.

FNFP 2015 contains also provisions directly supporting the use of wood as a source of renewable energy. The utilization of forest biomass is supported by the second objective of the first priority - utilizing the harvest potential. In the second priority, it is supported by the first objective - energy from wood.

BOX 2

Structure of the Finnish National Forest Programme

Priorities / Objectives

1. Securing a competitive operating environment for the forest industries and forest management
1. Increasing value added and providing new products and services
2. Utilizing the harvesting potential
3. Sustainability of roundwood production
4. Profitability and holding size in non-industrial private forestry
5. Condition of transport networks
6. Sufficiency of labour and entrepreneurship

2. Enhancing the climate- and energy-related benefits of forests
1. Energy from wood
2. Wood products
3. Climate change and forestry

3. Protecting the biological diversity and environmental benefits of forests
1. Biological diversity of forests
2. Water and soil

4. Promoting the use of forests as a source of culture and recreation
1. Ecotourism and the natural products industry
2. Recreational use of forests and the right of public access
3. Culture based on forests and wood

5. Strengthening skills, expertise and acceptability of the forest sector
1. Foresight work in the forest sector
2. Research and development in support of business and entrepreneurship
3. Professional training in the forest sector
4. Social acceptability of the forest sector
5. Forest-related knowledge and skills among children and young people

6. Promoting sustainable forest management in international forest policy
1. International forest policy
2. Forest affairs within the European Union
3. Development cooperation and other bilateral cooperation

Source: Finland's National Forest Programme 2015, 3b 2008

The Finnish National Forest Programme contains necessary measures for achieving the objective of utilizing the harvest potential of the Finnish forests as follows (responsible organisations/ authorities in parenthesis):

- Improving of management planning and advisory services for forest owners by ensuring that information about forest resources is up to date, and by stepping up and improving the methods of collecting and using that information. Increasing the use of other site-specific natural resource information systems (Ministry of Agriculture and Forestry, Forestry Development Centre Tapio, Forestry Centres, Forest Management Associations).

- Developing and improving of advisory services for forest owners to ensure that forest owners are aware of the harvest potential and management needs of their forests as well as alternative methods for implementing management measures (Ministry of Agriculture and Forestry, Forestry Development Centre Tapio, Forestry Centres, Forest Management Associations, forest companies).
- Completing the changeover to electronic systems by advisory services for forest owners provided by Forestry Centres to produce electronic services based on forest resource data for forest owners and the actors authorised by them (Ministry of Agriculture and Forestry, Ministry of Finance, Forestry Development Centre Tapio, Forestry Centres).
- To meet increasing obligations, improving public administration of the forest sector, clarifying the division of duties among forest actors, and improving the preconditions of competitiveness (Ministry of Agriculture and Forestry).
- Drawing up of a comprehensive national programme for peatlands, as well as a development programme to improve the cost-effectiveness of increasing thinnings and peatland fellings (Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of the Environment, Central Union of Agricultural Producers and Forest Owners, Forestry Development Centre Tapio).
- Defining of management goals for commercial forests administered by Metsähallitus in conjunction with the preparation of the strategy and natural resource plans of Metsähallitus (Ministry of Agriculture and Forestry, Metsähallitus).
- Studying the effects of land-use restrictions on the exploitation of regional harvest potential (Ministry of Agriculture and Forestry, Finnish Forest Research Institute).

In order to achieve the specific objective of energy from wood, the Finnish National Forest Programme adopted following measures:

- Following the National Energy and Climate Strategy and the Bioenergy Programme, promoting the use of wood for energy, taking into account the operating conditions of the forest industry, to formulate a policy for the use of peat and to determine the means for promoting decentralised production of power and heat from wood (Ministry of Employment and the Economy, Ministry of Agriculture and Forestry).
- Conducting experimental, demonstration and commercialisation projects for expanding and improving the efficiency of wood-based energy production, and developing methods for growing wood for energy (Ministry of Employment and the Economy, Ministry of Agriculture and Forestry, research institutions).
- Supporting the harvesting and chipping of small-diameter wood for energy production, and promoting heating entrepreneurship (Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Employment and Economic Development Centres, Forestry Centres, Work Efficiency Institute).
- Organising a national system for bioenergy advisory services and improving the provision and use of advisory services in energy and investment subsidies to promote the production and use of energy wood whilst ensuring that the subsidies do not distort competition (Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Forestry Development Centre Tapio, Motiva, ProAgria, Forestry Centres).
- Continuing with the practice of supporting the changeover of small residential buildings from electricity and oil-based heating systems to wood-based and other heating systems using renewable fuels (Ministry of the Environment, The Housing Finance and Development Centre of Finland).

3.2 Development Policy of the Agricultural Sector 2007-2013 and National Forest Programme in Slovakia

The Agricultural Development Policy for 2007– 2013 – Part Forestry has been worked out in Slovakia in relation to the vision and strategy of the EU Forest Action Plan (October 2005). This document formulates the basic strategic objectives, targets and priorities of the agricultural sector in the mid-term perspective until 2013. In accordance with the EU Forest Strategy and with the EU Forest Action Plan, the Slovakian Forest Policy has defined the following strategic objective: *Ensuring sustainable forest management based on the rational use of economic, ecological and social functions of the forests for promoting the development of the society and in particular for promoting the development of rural areas.*

The Slovak National Forest Programme was adopted by the Government of the Slovak Republic in 2007. It updates the forestry priorities, provides a framework for the impacts of other sectors on forest policy, demonstrates increased awareness of the importance of forests for society, it involves governmental and non-governmental organisations and groups to deal with the issues of forests and forest management and to resolve problematic issues within the competence of various state authorities and organisations. The objectives and provisions of the Slovak National Forest Programme are set out in Box 3.

In the course of the elaboration of the NFP in Slovakia, the following forest policy documents at national and international levels were taken into account: EU Forest Strategy, EU Forest Action Plan, Agricultural Development Policy for 2007–2013 – Part Forestry, as well as other international commitments of Slovakia (MCPFE resolutions), forest-related global processes (UNFF), international conventions (e.g. Convention on Biological Diversity (CBD), Convention on Climate Change (UN FCCC), Kyoto Protocol).

Forest biomass utilization is supported mainly in the third objective by the eighth priority (contribution of forests and forestry to the development of the rural economy) and by the twelfth priority in the fourth objective (use of forest biomass in generation of energy).

In order to achieve the priority of the contribution of forests and forestry to the development of the rural economy, the National Forestry Programme of the Slovak Republic adopted the following objectives:

- The objective is that rural regions should create approximately 45% of the gross value added and 50% of employment. In forestry, along with the traditional income from wood products, it is necessary to carry out measures aimed at increasing employment and incomes through diversification of forestry and non-forestry activities as well as through activities carried out within the framework of the related sectors. The priority areas are tourism (forest tourism, hunting), energy (use of alternative energy sources, i.e. bioenergy, water) and the environment (environmental services for the protection and enhancement of biodiversity).
- The framework objective is the application of specific forms of businesses, services, marketing and advisory activities in forestry to improve the socio-economic parameters in rural areas.

BOX 3

Structure of the Slovak National Forest Programme

Strategic Objectives / Priorities

1. Support of ecological forest management

1. To support environmentally-friendly forest management
2. To support the development and use of environmentally-friendly technologies
3. To support conservation, improvement and enhancement of biodiversity

2. Improvement and protection of the environment

4. To mitigate the consequences of climate change and to support the adaptation of forests to the impacts of climate change
5. To reinforce forest protection
6. To develop forest monitoring

3. Improving the quality of life

7. To conserve and improve the protective functions of forests
8. To increase the contribution of forests and forestry to the development of the rural economy

4. Increasing long-term competitiveness

9. To increase the long-term competitiveness and economic viability of multi-functional forestry
10. To support research and technological development in order to improve the competitiveness of the forestry sector
11. Valuation and marketing of forest non-wood products and services
12. To support the use of forest biomass in the generation of energy
13. To support cooperation among forest owners and to improve education and training in forestry

5. Strengthening cooperation, coordination and communication

14. To ensure the implementation of international commitments related to forests and forestry in pursuing the objectives of the National Forest Programme
15. To strengthen cross-sectoral cooperation and coordination among policies affecting forests and forestry
16. To meet the justified interests and needs of forest owners and of society
17. To support the use of wood harvested from sustainably managed forests
18. To support environmental education and systematic work with the public in order to achieve positive changes in perception of forestry by the public

Source: National Forestry Programme of the Slovak Republic, 2007

To achieve the priority regarding the use of forest biomass in energy generation, the following framework objectives were adopted by the National Forestry Programme of the Slovak Republic:

- Utilization of forest biomass for energy generation as an important factor in sustainable regional development, particularly in rural areas, to support the creation of stable employment opportunities, improvement of the environment, development of infrastructure and of alternative use of forest lands by increasing the areas of energy plantations on forest lands of low productivity and afforestation of agricultural lands unsuitable for agricultural production.
- Increasing energy independence of the country and its agricultural organisations by developing the use of forest biomass and other renewable energy sources; reduction and stabilisation of costs of energy generation while maintaining reliability of supply with favourable impacts on the environment and forest management.
- Optimising the use of fuelwood biomass from forestry up to 2015, while achieving energy and economic effectiveness comparable to the EU countries by applying proper financial and legislative instruments and research achievements.

4 Policies on the use of wood as a source of renewable energy

4.1 EU policies on energy wood utilization

There have been several documents adopted by the European Commission, the European Parliament, and the European Council with provisions supporting the use of renewable energy sources.

BOX 4

The EU and the world are at a cross-road concerning the future of energy. The challenges of climate change caused by anthropogenic emissions of greenhouse gases, mainly from use of fossil energy, need to be tackled effectively and urgently. Recent studies have contributed to growing awareness and knowledge of the problem and its long-term consequences, and have stressed the need for decisive and immediate action. An integrated approach to climate and energy policy is needed given that energy production and use are primary sources for greenhouse gas emissions. The European Union's increasing dependence on energy imports threatens its security of supply and implies higher prices. Europe currently imports 50 % of its energy requirements and this dependency is set to reach 70 % by 2030. Europe would thus be 90 % dependent for oil and 70 % dependent for gas. The price rises which have been noted are primarily the result of the rising global demand for limited and sometimes dwindling resources (Official Journal of the EU, 2008/C 211/04).

Directive 2001/77/EC (OJ L 283, 27.10.2001) of the European Parliament and of the Council on the promotion of electricity generated from renewable energy sources in the internal market sets a 21% indicative share of electricity generated from renewable energy sources in Community's total electricity consumption by 2010. It defines the national indicative targets for each Member State, encourages the use of national support schemes, the elimination of administrative barriers and grid system integration, and it sets the obligation to issue renewable energy producers with guarantees of origin if they request them. With the current policies and efforts in place, it can be expected that a share of 19% – rather than the 21% aimed at – will be reached by 2010.

Directive 2003/30/EC (OJ L 123, 17.5.2003) of the European Parliament and of the Council on the promotion of the use of biofuels or other renewable fuels for transport sets a target of 5.75% of biofuels of all petrol and diesel consumed by transport by 31 December 2010. The Member States were required to set indicative targets for 2005 taking a reference value of 2% into account. This interim indicative target has not been achieved. Biofuels accounted for 1% of the fuel consumed by transport in 2005. The Commission's conclusion according to the assessment of the progress is that the target for 2010 is not likely to be achieved – the expectations are for a share of about 4.2%.

The European Parliament noted in its Resolution on Climate Change (14 February 2007) that an energy policy is a crucial element of the EU's global strategy on climate change in which renewable energy sources and energy efficient technologies play important roles. The Parliament supported the proposal of a binding target to increase the level of renewable energy in the EU energy mix to 20% by 2020 as a good starting point, and considered that this target should be increased to 25%. Furthermore the European Parliament, in its Resolution on the Roadmap for Renewable Energy in Europe (25 September 2007), called on the Commission to present by the end of 2007 a proposal for a renewable energy legislative framework, referring to the importance of setting targets for the shares of renewable energy sources at EU and Member State level.

The European Council of March 2007 (Council Document 7224/07) reaffirmed the Community's long-term commitment to the EU-wide development of renewable energies beyond 2010 and invited the Commission to submit its proposal for a new comprehensive Directive on the use of

renewable resources, including legally binding targets for the overall share of renewable energy and the share of biofuels for transport in each Member State. The proposal of the Directive on the promotion of the use of energy from renewable sources was issued by the Commission on 23 January 2008 (COM(2008) 19 final). It endorsed a mandatory target of a 20% share of renewable energies in the overall Community energy consumption by 2020 and a mandatory 10% minimum target to be achieved by all Member States for the share of biofuels in transport petrol and diesel consumption by 2020 to be introduced in a cost-effective way.

The Member States' starting points with regard to renewable energy potentials and energy mixes vary. It is, therefore, necessary to translate the overall 20% target into individual targets for each Member State, with due regard to a fair and adequate allocation while taking into account different national starting points and potentials, including the existing level of renewable energies and energy mix.

Different methods are assessed, including modelled resource potential in each Member State, applying a flat-rate increase for all Member States, and modulating results by GDP to reflect fairness and cohesion. The conclusion is that a flat-rate approach modulated by GDP is the most appropriate as it provides a simple common and fair increase for all Member States. When weighted according to GDP, the result reflects the wealth of the different Member States, and when modulated to take into account early progress in developing renewables, the result recognises the role that "early starters" have played in leading the development of renewable energy in Europe and it also reflects an overall cap on the targeted share of renewable energy in 2020 in individual Member States (Table 1).

The Directive set also the obligation for each Member State to adopt a national action plan. The national action plans is required to set out the Member State’s targets for the shares of energy from renewable sources in transport, generation of electricity and heating energy, and cooling in 2020, and the adequate measures to be taken to achieve these targets, including national policies to develop existing biomass resources and mobilise new biomass resources for different uses, and the measures to be taken to fulfil the requirements. Member States are required to submit their national action plans to the Commission by 31 March 2010 at the latest.

The Member States are also required to submit a report to the Commission on the progress achieved in the promotion and use of energy from renewable sources by 30 June 2011 at the latest and every two years thereafter.

The report is required to detail in particular the following:

- The functioning of the system of guarantees-of-origin for electricity and heating and cooling from renewable energy sources and the measures taken to ensure reliability and protection against fraud;
- The progress made in evaluating and improving administrative procedures to remove regulatory and non-regulatory barriers to the generation of energy from renewable sources
- The developments in the availability and use of biomass resources for energy purposes and
- Changes in commodity prices and land use within the Member State associated with its increased use of biomass and other forms of energy from renewable sources;

Table 1. National overall targets for the share of energy from renewable sources in final consumption of energy in 2020.

	Share of energy from renewable sources in final consumption of energy, 2005 (S2005)	Target for share of energy from renewable sources in final consumption of energy, 2020 (S2020)
Belgium	2.2%	13%
Bulgaria	9.4%	16%
The Czech Republic	6.1%	13%
Denmark	17.0%	30%
Germany	5.8%	18%
Estonia	18.0%	25%
Ireland	3.1%	16%
Greece	6.9%	18%
Spain	8.7%	20%
France	10.3%	23%
Italy	5.2%	17%
Cyprus	2.9%	13%
Latvia	34.9%	42%
Lithuania	15.0%	23%
Luxembourg	0.9%	11%
Hungary	4.3%	13%
Malta	0.0%	10%
The Netherlands	2.4%	14%
Austria	23.3%	34%
Poland	7.2%	15%
Portugal	20.5%	31%
Romania	17.8%	24%
Slovenia	16.0%	25%
The Slovak Republic	***6.7%***	***14%***
Finland	***28.5%***	***38%***
Sweden	39.8%	49%
United Kingdom	1.3%	15%

Source: Proposal for a Directive of the European Parliament and of the Council 2008/0016 (COD)

4.2 Provisions of the Finnish national policy on the use of wood for energy

Bioenergy plays an important role in the decentralised and diversified Finnish energy system. Finland is one of the world leaders in the utilization of bioenergy. Almost 20% of the total primary energy consumption in Finland is satisfied by bioenergy. The Finnish national policy on renewable energy was reviewed in April 2008 (www.erec.org,) and approved by the Finnish Government's Report on Climate and Energy Strategy submitted to the Parliament on 6 November 2008. The National Action Plan for Renewable Energy Sources (RES) aims at further increasing the use of biomass by 2010. The share of bioenergy in the country's overall energy source palette should be 30% higher than in 2001. Increasing the use of renewable energy by at least 25% by 2015 and by 40% by 2025 are key objectives in Finland's energy policy. There is no specific national target/ commitment for heating and cooling.

The strategic objective set by the Finnish Government entails halting and reversing the growth in energy consumption so that in 2020 final energy consumption would amount approximately to 310 TWh, i.e. over 10% less than the baseline. The longer-term vision entails a further decrease in final energy consumption by 2050 of at least one third of the consumption in 2020. In order to achieve these objectives, the efficiency of energy consumption must be enhanced, particularly in housing, construction and transport. The range of measures required is broad and will be completed as part of the on-going work of the Energy Efficiency Committee.

The goal is to increase the share of renewable energy to 38% by 2020, which is in line with the obligation proposed by the Commission for Finland. This is a challenging obligation, and its achievement depends on a downward trend in energy consumption.

The indicative country target set by the European Directive on RES electricity from 2001 (Directive 2007/71/EC) is a 31.5% share of RES in the gross electricity consumption by 2010. Meeting such an obligation requires a substantial increase in the use of wood-based energy, waste fuels, heat pumps, biogas, and wind energy. A cost-effective feed-in tariff system, operating on market terms as far as possible, will be introduced as a new promotional method.

Matters concerning financial needs will be handled and decided on as a part of the framework decision and budgeting processes of the state economy. According to the framework decision taken by the Government on 13 March 2008 on the state budget for 2009-2012, a decision will be taken in the budget proposal for 2009. In connection with the budget proposal for 2009, decisions were based on measures targeted for 2008 and 2009.

The current main policy objective is to expand the use of RES in CHP –district-heating schemes and also of biofuels in the transport sector. While Finland‘s policy framework for bioenergy has been very effective, the use of other RESs has been less so. Additional support in the form of feed-in tariffs based on purchase obligations or green certificates is being considered for on-shore wind power.

4.3 Provisions of the Slovak national policy on the use of wood for energy

The Slovak National Renewable-Energy Policy was reviewed in April 2008 (www.erec.org). Fossil fuels cover 95 % of the primary energy needs in Slovakia, and more than 90% of primary energy sources are imported. At the same time, Slovakia possesses great potential for utilizing biomass from the country’s own forests. However, the Government has decided to make use of this resource only in remote, mountainous, rural areas, where natural gas is not available. About 40% of the primary energy consumption is used for generating heat with roughly half of the households being served by district heating. The main energy source for district heating is natural gas (more than 70%), which is often used in combined heat and power generation.

Large-scale hydro energy is the only RES-E with a notable share in Slovakia’s total electricity consumption. The Government approved the Strategy of Higher Utilization of Renewable Energy Sources (RES) in April 2007 and some of its measures support the use of RES. The Government has presented a proposition to decrease the target to 19% RES-E in 2010 (instead of 31%), which means RES-E growth of only 1.35% compared to 2002. The official national policies (e.g. Strategy for Renewables, 2006) state that only between 3.2% (2003) to 4.3% (2005) of the gross domestic energy consumption is derived from renewables (the vast majority of renewable energy coming from existing large hydro-electricity plants).

The mandatory target for Slovakia set by the newly proposed RES EU Directive from 2008 is for the RES share to be 14% of the final consumption of energy in 2020.

The national commitments of on-going legislative measures are as follows:

- Legislation on RES electricity had to be prepared by end of 2007 (proposal still not published, preparation process delay).
- Support programme for households and housing associations for solar thermal and biomass technologies installation (programme had to be prepared till the end of 2007 according to Government resolution)
- Biomass action plan under preparation, end November 2007 (January 2008: proposal of National Biomass Action Plan being amended)

5 Analysis of the market for wood as a renewable energy source

Renewable energy sources are regarded as promising energy sources of domestic origin especially as regards energy from water, biomass and geothermal energy. Biomass is considered to be the source having the highest potential. Slovakia's energy dependence on fossil fuels will be decreased through biomass utilization and at the same time the country's domestic energy sources will be assessed, the reliability of energy deliveries will be increased, and economic activities and new job opportunities will be created in rural areas. Negative environmental impacts will be mitigated through reduced use of fossil fuels. At the same time, the cost of energy for final consumers will be reduced. These positive impacts will contribute to the product's competitiveness on the market, providing the issues of sustainability of biomass production and use are considered.

5.1 The energy wood market in Finland

The share of RES in Finland's final energy consumption was 28.5% in 2005 (Table 1) and the share of RES in total electricity consumption reached 24% in 2006 (Table 2).

Hydroelectric power (HEP) amounts to 52.2% of the RES-generated electricity in Finland. Due to environmental reasons, the share of HEP cannot be increased substantially. The generation of hydroelectric power depends on the hydrological situation and year-to-year differences can be as high as 30% to 50%.

Biomass is the renewable energy source with the highest technical potential in Finland and it contributes 47.1% to the share of RES in the generation of electricity (Figure 21). It is the second most significant renewable energy source in electricity production. The amount of electricity generated from biomass depends on the output of forestry, which varies according to the market conditions.

Finland's indicative target for electricity generated from renewable energy sources is 31.5% of the gross domestic electricity consumption by 2010. It presents an increase of 7.5 percentage points in four years.

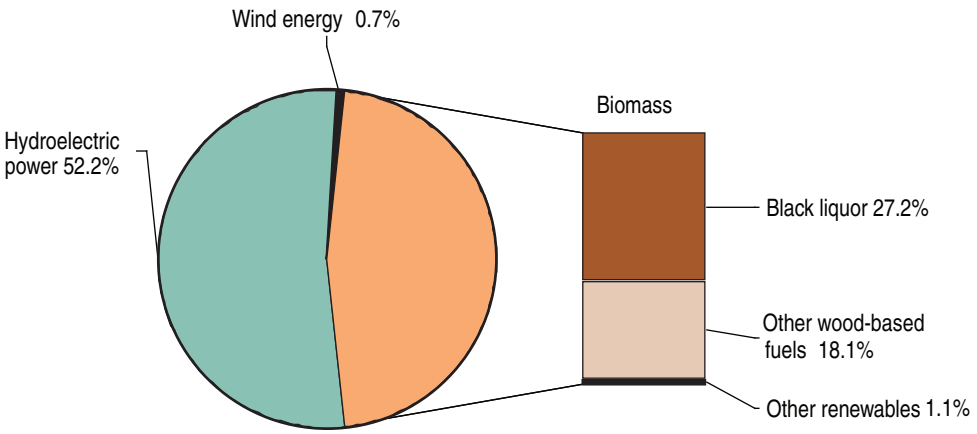

Figure 21. Generation of electricity from renewables by source, 2006.
Source: Statistics Finland, 2007

Table 2. The share of RES in electricity consumption in 2006 and the target for 2010.

Indication/value	
Share of RES in electricity consumption [%]	24
Electricity generation from RES [GWh]	21.760
Share of biomass in electricity generation from RES [%]	47.1
Target for electricity generation from RES by 2010 [%]	31.50

Source: Report by Finland on implementation of Directive 2001/77/EC, 2007

The annual consumption of firewood in small residential houses amounts to 5-6 million m^3. Additionally, over 3 million m^3 of forest chips are produced for energy generation. Forest chips consist mainly of branches, tops and stumps of trees and these are collected in conjunction with regeneration fellings as well as chips from trees felled in thinnings. The potential capacity for producing forest chips is estimated to be about 12-15 million m^3 per year. About 350,000 tonnes of wood pellets are also produced per year, and one fifth of this amount is used domestically.

The wood-processing industries are a substantial source of renewable energy having produced more than 10 million m^3 of residues in 2007, of which about 0.87 million m^3 of chips, more than 1.71 million m^3 of sawdust, and more than 7.46 million m^3 of bark. The total energy value of all these was 77.1 PJ.

The use of wood-based fuels and their share in the total energy consumption have grown since 2001. The share of consumption of wood-based fuels in the total energy consumption increased from 18.9% in 2000 to 20.7% in 2006 (Figure 22).

Black liquors and other by-products of the forest industries accounted for 52% of the consumption of wood-based fuels in 2006.

The overall use of wood-based energy increases and the volume of forest chips used for energy generation will rise until 2015 to 8-12 million m^3 per year; this is the average prediction of various scenarios (Metla, 2007). The use of forest chips for energy generation has been steadily increasing during the analysed period (2000-2006). In 2006, the increase amounted to 18.8 PJ, or 72.8% in comparison to 2000. In 2007, the volume of forest chips diminished by more than 11%. The indicative target for energy-generation use of forest chips shows an increase of 64% for 2010 and more than 300% for 2015 (Figure 23). The current share of used forest chips out of forest biomass potential is 19.16 %, the target in 2010 is 31.2 % and 62.2 % in 2015.

The development of the total use and price of forest chips shows a linear increase (Figure 24). Due to the increase in the demand for forest chips in Finland, the value of the total use of forest chips more than tripled and the price increased by more than 44% during the period 2000-2006.

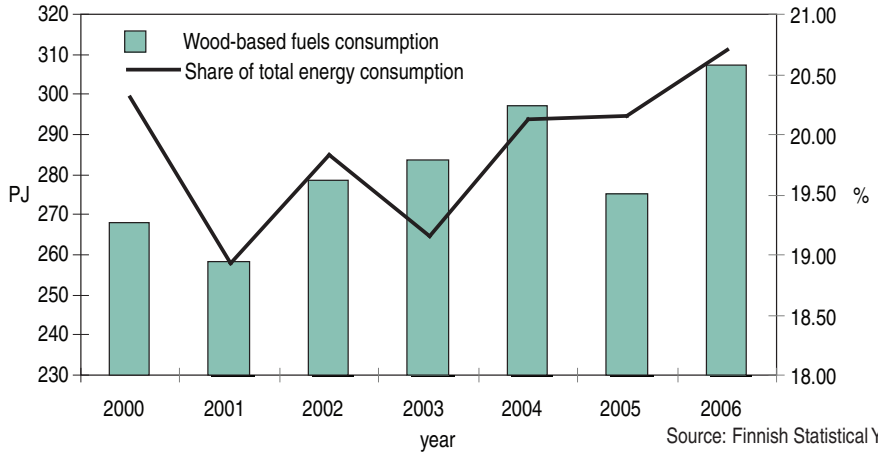

Figure 22. Wood-based fuels consumption and its share of total energy consumption.

Source: Finnish Statistical Yearbook of Forestry 2007, Metla

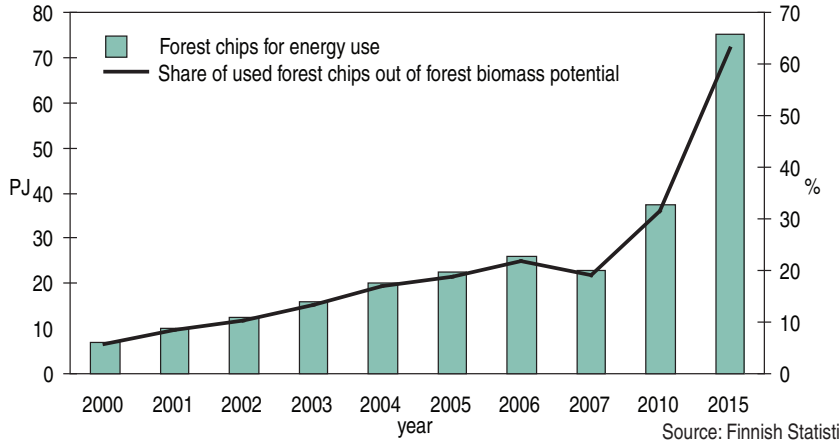

Figure 23. Production of forest chips for energy use and its share of forest biomass potential including target years 2010 and 2015.

Source: Finnish Statistical Yearbook of Forestry 2007, Metla

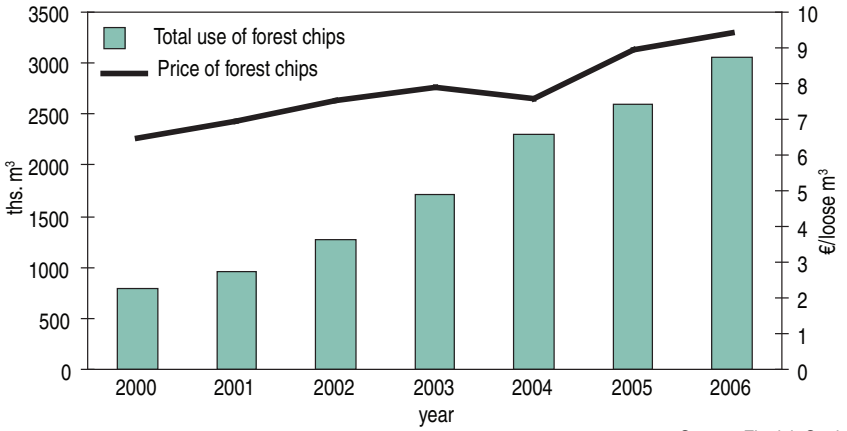

Figure 24. Development of total use and price of forest chips.

Source: Finnish Statistical Yearbook of Forestry 2007, Metla

5.2 The energy wood market in Slovakia

The share of RES in final energy consumption increased in Slovakia from 3.7% in 2000 to 6.7% in 2005 (Table 1). The share of RES in the total electricity consumption increased from 12.4% in 2003 to 16.1% in 2006 (Table 3). The greater amount of electricity produced in hydroelectric power plants was also due to more favourable weather conditions. A considerable increase occurred in the generation of electricity from biomass, due to both the installation of new facilities and increased generation in the existing facilities (Ministry of Economy, 2007). Biomass is the renewable energy source possessing the highest technical potential in Slovakia and it contributed to the increase in the share of RES in electricity production by 7.7% (Figure 25). It is the second most significant renewable energy source.

The Slovak Government approved the Strategy of Higher Utilization of Renewable Energy Sources in the Slovak Republic in April 2007 setting out the targets for the use of renewable energy sources to be achieved in regard to generation of electricity and heating energy by 2010 and 2015. The target share of RES is 31% of the gross domestic electricity consumption by 2010, and this requires an increase of 14.9 percentage points over a period of four years.

The annual available potential of forest biomass up to 2010 is about 2.432 million tonnes and this amount has an energy value of 26.8 PJ, of which forest chips account for 18 PJ (Table 4). After 2010, the total potential of woody biomass resources can increase if the biomass from energy wood plantations and the biomass from the expected increased fellings are utilized. The share of woody biomass can be increased utilizing municipal residues from park cleaning, municipal greenery, etc., all of which represent 300 ths. per year. The woody biomass potential can also be increased by harvesting it from energy wood forests, which results in 440 ths. The potential of woody biomass can be increased to 2.524 – 2.724 million tonnes per year by 2020.

Table 3. Share of RES in electricity consumption in 2006 and the target for 2010.

Indication/value	
Share of RES in electricity consumption [%]	16.1
Electricity production from RES [GWh]	4 781
Share of biomass in electricity generation from RES [%]	7.7
Target for electricity generated from RES by 2010 [%]	31.00

Source: Report by the Slovak Republic on the achievement of the indicative target, The Ministry of Economy, 2007

Table 4. The available potential of wood-based fuels.

Producer and type of biomass		Annual available potential, t	Energy potential, PJ
Forestry		2 432 000	26.8
of which	fuelwood	800 000	8.8
	forest chips	1 632 000	18.0
Wood-processing industries		1 835 000	22.0
of which	solid residues	1 365 000	16.4
	liquid residues	470 000	6.6
Municipal sector		300 000	3.6
of which	fuelwood	50 000	0.7
	wood chips	250 000	2.9
Total		4 567 000	52.4

Source: NFC Zvolen, 2007

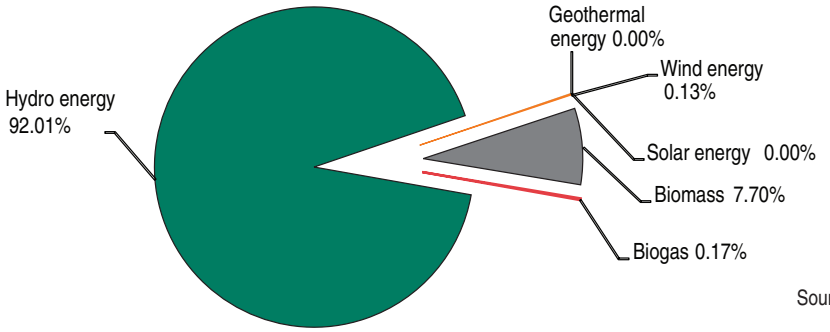

Figure 25. Production of electricity from renewables by source, 2006.

Source: The Ministry of Economy, 2007

Table 5. The total energy potential of biomass.

Type of biomass	Amount [t]	Energy potential [PJ]
Agricultural biomass for combustion	2 031 000	28.6
Woody biomass	2 432 000	26.8
Wood-processing industries	1 835 000	22.0
Biomass for biofuel production	200 000	7.0
Municipal wood waste	300 000	3.6
Die-castings by biofuel production	400 000	8.4
Animal manure	13 700 000	10.0
Purpose-grown biomass for energy generation	4 050 000	40.6
Total	24 948 000	147.0

Source: NFC Zvolen, 2007

The contribution of the domestic available potential of woody biomass for energy generation for the total annual consumption of primary energy sources can be considerably higher in the near future that it is at present.

The overall annual biomass potential for energy generation is 147 PJ (Table 5), which represents (at € 16.60 /GJ) the amount of € 1.89 billion excluding VAT. The share of woody biomass in the total energy potential of biomass is about 18%.

The wood-processing industries are substantial sources of wood-based fuels as these industries annually produce more than 1.8 million tonnes of residues, of which about 0.65 mill. tonnes are composed of coarse woody material, more than 0.3 million tonnes of sawdust, and more than 0.45 million tonnes of black liquor. Their total energy value is 17.6 PJ.

According to available data, there are sixteen producers of briquettes and six producers of pellets in Slovakia. They produced approximately 40,000 tonnes of briquettes and 28,000 tonnes of pellets in 2005. Nevertheless, the installed production capacity is far higher.

The share of wood-based fuels consumption in the total energy consumption increased from 1.34% in 2002 to 2.11% in 2005 (Figure 26). As regards its technical potential, its share in the total energy consumption is insufficient.

The use of forest chips to generate energy rapidly increased in 2005 due to processing of the wood harvested after the storm damage in November 2004 and also due to the start-up of new heating plants in compliance with the action plan for forest biomass use. This increase was 0.902 PJ, or more than four times the amount generated in 2004. Nevertheless, it represented only 10% of the forest biomass potential in 2007 (Figure 27). Data on the indicative targets specifically for the energy-generation use of forest chips in 2010 and 2015 were not available.

The difference between heat generation from the overall resources of biomass (its share in the overall biomass potential) and the indicative targets for 2010 and 2015 are shown in Figure 28. The share of heat generation from biomass compared to the overall biomass potential was only 1.39% in 2005. The indicative target for 2010 is 20.83% of the biomass potential, which is an increase of more than 19 percentage points when compared to 2005. It is expected that the increase will be more than 29 percentage points by 2015. In terms of energy value, the target for 2010 represents a 15-fold increase of the target for 2015 represents a 22-fold increase in heat generation from biomass when compared to 2005.

The indicative targets from the Strategy of Higher Utilization of Renewable Energy Sources in the Slovak Republic have been set based on the potential of the various energy resources, the current situation as regards their utilization, and their expected use in the future (The Ministry of Economy, 2007).

In 2007, the price of forest chips reached 1,389 SKK/tonne (exchange rate €/SKK= 33.603 in 2007) which is the second highest price for the period of 7 years. This price trend reflects the increasing demand for forest chips in Slovakia (Figure 29).

The domestic consumption of forest chips has increased slower than forest chip production. During 2004-2005, more than 50% of the production was exported to Hungary, the Czech Republic, and Austria. Since than, the amount of exported woody biomass has gradually diminished due to the smaller price differences between the domestic and foreign markets (NFC, 2007).

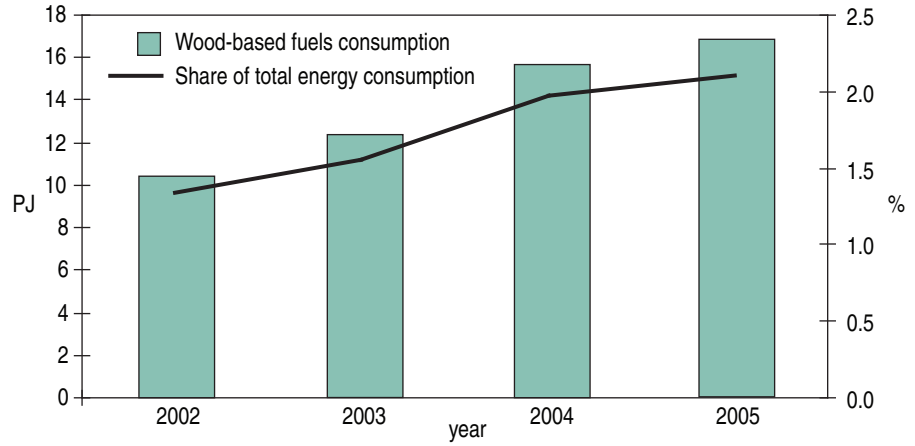

Figure 26. Wood-based fuels consumption and its share in the total energy consumption.
Source: The Ministry of Economy, 2007

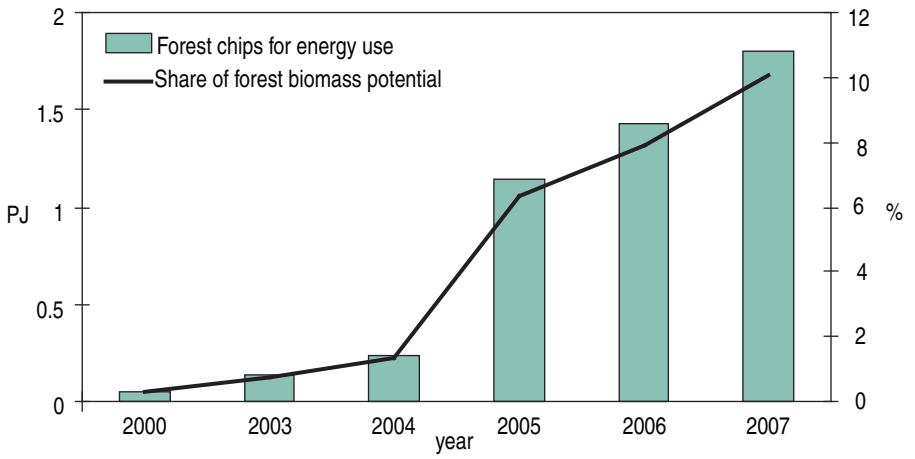

Figure 27. Development of forest chips use for energy and its share in forest biomass potential.
Source: The Ministry of Economy, 2007; Green Report, 2008

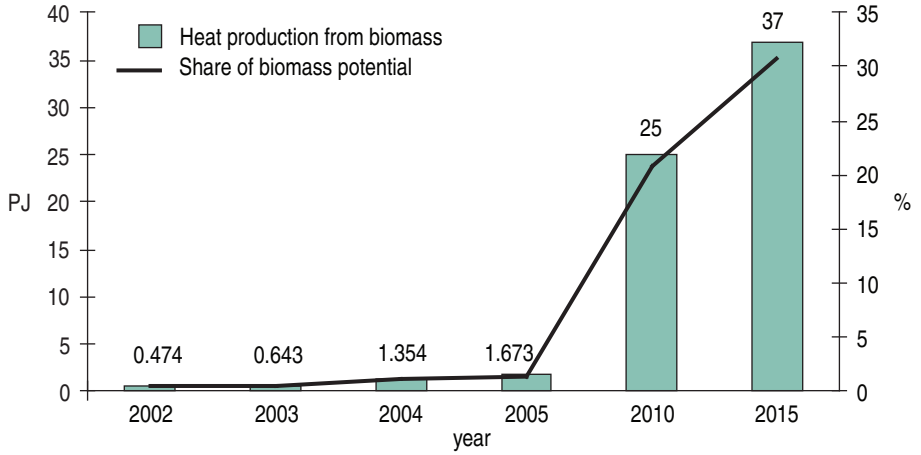

Figure 28. Development of heat production from biomass and share of biomass potential.
Source: The Ministry of Economy, 2007

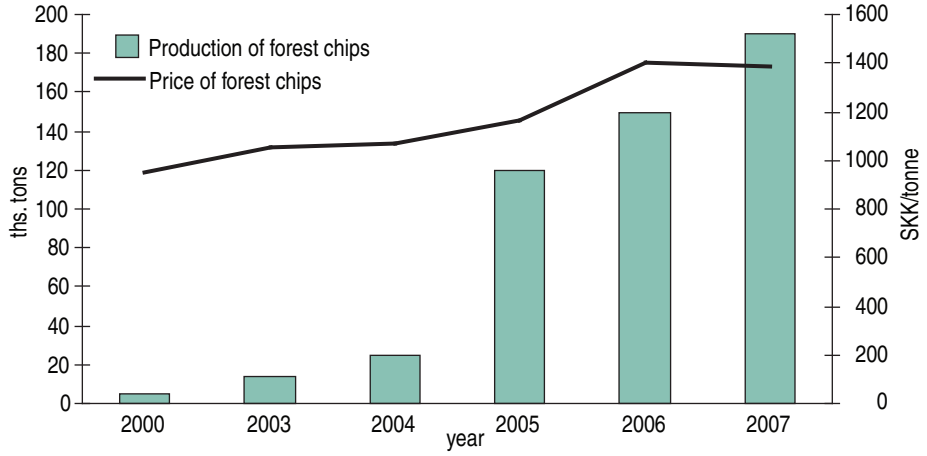

Figure 29. Development of production and price of forest chips.
Source: NFC, 2007; Green report, 2008

BOX 5

	Finland	Slovakia
Share of RES in final energy consumption [%]	28.5	6.7
Target for RES in final energy consumption 2020 [%]	38	14
Share of RES in electricity consumption [%]	24	16.1
RES production [GWh]	21,760	4.781
Share of biomass in electricity production from RES [%]	47.1	7.7
Target for electricity generated from RES by 2010 [%]	31.50	31.00
Energy potential of forest biomass (excl. fuelwood) [PJ]	119	18
Wood-based fuels consumption [PJ]	307	16.8
Share of wood-based fuels in overall energy consumption [%]	20.7	2.1
Forest chips for energy generation [PJ]	22.8	1.8
Share of forest chips in forest biomass potential [%]	19.1	10
Price of forest chips(2007)	9.4 €/loose m^3	41 €/t[1]
Relative increase of forest chips price (2006/2000) [%]	144	147

[1]Exchange rate €/SKK= 33.603 in 2007; http://www.etrend.sk/

6 Analysis of the barriers to energy wood utilization

6.1 Barriers common to EU Member States

Several directives have been adopted by the European Commission during the past few years supporting the increased use of renewable energy sources. Nevertheless, practical implementation has shown that there are still barriers hindering the achievement of the target levels set for the share of renewable energy sources in the mix of available energy sources. Some of them are country-specific, and some are common to all EU Member States. The barriers common to the EU Member States have been compiled from the following information sources: Communication from the Commission to the Council and the European Parliament, 2006; The support of electricity from renewable energy sources, 2005; Standards and codes applied to heating and cooling from renewable energies sector, Final Report, 2007

One of barriers associated with all types of bioenergy ***is inconsistency in defining biomass.*** In many countries, paper, sewage sludge, black liquor (e.g. Austria, Germany) or wood treated with organic preservatives are not recognised as being biomass. Consequently, installation operators cannot benefit from the related supporting programmes. There is a need to establish equal conditions in this energy market throughout the EU, in particular with regard to the biogenic fractions of waste and other mixed-type fuels.

Administrative barriers such as ***long and complex authorization procedures*** persist in some countries due to ***inadequate coordination between different administrative bodies. Legislation also differs within the EU Member States***. In some cases, national regulations are by far stricter than the EU regulations. This can produce significant market problems in certain countries.

An important issue that could hinder the greater use of renewable energy sources is the existence of several layers of competence for the authorisation of generating units. The requirements imposed by the multiple authorities involved (national, regional, and municipal) often lead to delays, investment uncertainty, multiplication of efforts, and potentially greater demands for incentives by developers in order to offset investment risks or the initial capital intensity of projects.

Where different levels of administrations are involved, the Member States should appoint one-stop authorization agencies to bear the responsibility for the co-ordination of several administrative procedures. Standard forms and requirements should also be used by the different authorities. Clear guidelines for authorization procedures are highly recommended and obligatory response periods for the authorities involved need to be incorporated in such procedures. The setting of approval rates is an excellent tool for checking the streamlining of authorizations.

RESs are insufficiently taken into account in spatial planning. In many countries and regions, the future development of RES projects is not taken into account in the drawing up of spatial plans. This means that new spatial plans have to be adopted in order to allow for the implementation of a RES project in a specific area. This process can take a very long time. Often, obtaining the permits related to spatial planning accounts for the largest part of the overall period needed for the development of a project. This is especially the case with projects in the field of wind and biomass. Bodies should be encouraged to anticipate the development of future RES projects (pre-planning) in their region by allocating suitable areas.

Where different levels of authorities are involved, a possible solution could be in the preplanning carried out in Denmark and Germany where municipalities are required to assign locations that are available to project developers for a targeted level of renewable electricity generating capacity. In these pre-planned areas, the permit requirements are reduced and implemented faster.

Another obstacle identified in connection with bioenergy systems is the ***unequal treatment of electrical power and heat with regard to tariffs and subsidies***. The heating-energy sector is far behind the electricity sector despite the more long-term potentials identified in the heating-energy sector. This barrier concerns energy generation in small- and large-scale plants as well as in waste-to-energy units. The licensing of waste-to-energy plants in some countries (e.g. UK) is an expensive and time-consuming process.

In most of the New Member States (NMS) there is a high potential for the use of biomass for gener***a***ting heat energy. But regulations relating to bioenergy (biomass) are usually dispersed among different policy sectors because bioenergy issues are keenly connected to energy, agricultural, and forestry policies. ***None of the New Member States has a consolidated document combining all the regulations related to bioenergy.*** Legislation on renewable energy could provide transparent and complete regulations for the bioenergy sector. There is still a lack of national and regional programmes, especially those dedicated to bioenergy development.

A Europe-wide scheme for a unified label or standard for compressed biomass fuels (briquettes, pellets) is lacking, both for natural and recovered biomass fuels. Users of small-scale pellet boilers for heating would benefit from a minimum standard or quality label for pellets guaranteeing a number of properties ensuring easy fuel handling, the smooth functioning of their boilers, easy ash handling, and low level of air pollution. Biomass-fired heating devices are more expensive than fossil-fuel-fired devices.

The European trading scheme provides benefits for biomass-fired installations above 20 MW firing capacity. Smaller installations, however, are not included. Here an ***appropriate link is missing in support of small-scale biomass-fired heating installations.*** Alternatively, a corresponding tax relief for biomass-fired boiler operators could be proposed in the EU Member States.

The European Union will most probably not be able to fulfil an important share of its energy balance from domestic biomass sources given the competing interest regarding biomass resources coming from the food, liquid fuel, pulp-and-paper, construction materials, chemical, and other industries. This means that an increasing amount of biomass fuels will have to be imported. While biomass fuels made from wood waste and forest residues usually hold a major net energy benefit, biomass fuels made from energy crops do not necessarily do so. Biomass fuel supplies from abroad may, therefore, provide very little net energy benefit or even result in a negative net energy balance. Accordingly, a standard should be developed for evaluating all the processes required to make biomass fuel available on the EU's fuel market.

Despite encouraging and new prospects and robust technology track records, renewable energy projects and businesses continue to face ***significant difficulty in raising sufficient finance for investments***. The problem is complex, but mainly concentrated in the area of risk capital, which provides important collateral for lenders. Some of the key reasons leading to this financial gridlock are as follows (Communication from the Commission to the Council and the European Parliament, 2006):

- ***The initial capital costs of renewable energy technologies are 3–7 times higher than those for conventional fossil-fuel-based generation.*** While these costs are compensated for by much lower and less volatile running costs compared to fossil-fuel-based technologies, private sector investors still regard the longer repayment periods as too risky and therefore unattractive.

- ***Outside the OECD region, private equity investors are looking for additional reassurances.*** Even reasonable returns in the range of 6% to 14% are inadequate for offsetting the various risks in many developing countries.

- Renewable energy technologies are highly suitable for small- and medium-sized investment projects. However, this leads to ***significantly higher transaction costs*** compared to large-scale fossil-fuel-fired power plants, and therefore this has been less interesting for conventional risk capital providers. Where international finance institutions or the private sector has risk capital to offer, it is for large-scale investments with terms that are unsuitable for small businesses or projects of less than EUR 5-10 million total capital.

When competing for scarce private equity finance, these facts put renewable energy at a distinct disadvantage, which results in a general lack of equity finance for the sector. The World Bank recently came to a similar conclusion that "even with an improved regulatory environment and the use of policy risk mitigation instruments, the challenge of financing incremental costs and reducing technology risks will be significant" (World Bank, 2006). However, the high potential of renewables and energy-efficiency projects to generate a multitude of environmental and socio-economic public goods, both locally and globally, merits public support to solve this financing gridlock and to provide public incentives to international and domestic private investors. Governments will have to work hand-in-hand with the private sector in order to overcome the outstanding ***financial barriers***.

As regards the entire Renewable Heating and Cooling Sector, it can be concluded that only in very few countries are there ***administrative barriers*** which result in a completely halting development of the RE heating and cooling market. In most countries with very underdeveloped markets the administrative constraints are accompanied by pure economic performance of the measures and little knowledge among the involved stakeholders. Moreover, it should not be forgotten that the administrative procedures and licensing requirements have the effect of protecting the consumer or the environment and in this way they ensure the long-term sustainability of market development. Nevertheless, analysis has demonstrated that there is a lot of room for improvement. Administrative procedures have to be reformed to make them simpler, more directly targeted at the respective potentials and to require less time and less expenses for the project developers.

In addition to the barriers identified from other sources of information, the following barriers should also be taken into account: lack of clear definitions of the different types of bioenergy and lack of clear and broadly agreed methods of ***standardization*** hinder the market for bioenergy resources and fuels. It is necessary to develop ***certification schemes*** to ensure the sustainability of biomass production, especially in regard to ´the criteria and indicators of sustainable forest management, and sustainability of bio-fuels supply.

The analysis revealed that the markets for products with clearly defined fuel characteristics show the highest growth rates. Biomass fuels are on the way to receiving the status of an established standardized product.

This trend in market development is expected to continue in the future. The biomass potentials are quite different in the different EU Member States. Due to this, the cross-border trade in biomass will steadily increase as will import from third countries.

The targets set by the EU and national programmes and guidelines for biomass can only be achieved if the locally available biomass in some countries can be complemented by imports. Restrictions may be imposed on biomass fuel imports characterized by very low net energy benefits. The successful development of the biomass-to-energy sector requires the standardization of compressed fuels and small-size combustion equipments should be standardized for the mass market across the EU and even extending to the EU's cross-border trade.

The current activities of CEN/TC 335 in the sectors of solid biomass fuels and CEN/TC 343 in solid recovered fuels with ongoing translations into the languages of most of the EU Member States, are pointing in the right direction.

BOX 6

Barriers common to EU Member States

1. *Definition of biomass is inconsistent.*
2. *Long and complex authorization procedures.*
3. *Inadequate co-ordination between different administrative bodies. Legislation also differs within the EU.*
4. *RES inadequately taken into account in spatial planning.*
5. *The unequal treatment of electrical power and heating energy regarding tariffs and subsidies.*
6. *None of the New Member States has a consolidated document combining all the regulations related to bioenergy.*
7. *A Europe-wide scheme for a unified label or standard for compressed biomass fuels (briquettes, pellets) is lacking.*
8. *Suitable supporting small-scale biomass heating installations is missing.*
9. *The EU will most probably not be able to cover an important share of its energy balance from domestic biomass sources.*
10. *Significant difficulties in raising sufficient finance for investment*
11. *Standardization in bioenergy sector*
12. *Sustainability schemes*

Sources: Communication from the Commission to the Council and the European Parliament, 2006; The support of electricity from renewable energy sources, 2005; Standards and codes applied to heating and cooling from renewable energies sector, Final Report, 2007

6.2 Analysis of the barriers to energy wood utilization in Finland

The barriers to increasing the use of RES in Finland are as follows: market barriers, technological barriers, business barriers, economic barriers, and logistics barriers (VTT Technical Research Centre of Finland, 2003), which impact the market separately, but also in combinations.

Market barriers

One of the most important barriers to energy wood utilization are market barriers. There are still constraints on the part of investors to put their investment capital into businesses in the energy sector.

1. Uncertain chip supply

Uncertain chip supply hampers the development of heating plants and power plants (also CHP plants) and district-heating plants based on forest biomass. It is necessary to guarantee a stable supply of forest biomass because it guarantees returns on investments, which is a basic requirement not only of investors, but also of the banking sector providing loans for this purpose, and of households using boilers based on forest chips as fuel.

2. Availability in proportion to demand

The demand for forest biomass is still growing. It should be noted that availability is a reflection of the available potential of forest biomass. Despite the much higher total or technical potential of forest biomass, its available potential is lower than the demand for this commodity, and it is this which keeps other competitors from entering the market. This barrier is not only a market barrier but it is also a technological barrier, the elimination of which can increase the useful potential of forest biomass. This is a task for potential competitors.

Technological barriers

A common problem associated with all technological barriers continues to be the high price of technological solutions for efficient biomass procurement and combustion.

1. Unsuitability of boilers for chips combustion

The unsuitability of boilers for chips combustion is related to two problems. One is that the process of developing the efficiency of new boilers is still ongoing. The other one is the unsuitability of old boilers and inability of individual households to finance new installations. Different boilers require different fuel properties.

2. Unsatisfactory quality of chips

The quality of forest chips depends on the source of biomass and the technology used in its comminution, handling, and storage. Consistent particle size, low contents of moisture and foliage, and low ash production improve the usability of biomass, and the efficiency and economy of its combustion. Such problems can be solved by rearranging the fuel handling system, limiting the proportion of forest chips in the fuel blend, or through quality control which needs to be extended to all phases of fuel procurement, starting from stand selection.

Business barriers

The business environment in the use of RES is influenced by high risk focusing on the return on investment. The market characteristics include expensive technologies, the particularity of forest biomass as a commodity, the long payback period, and high competition coming from other types of fuels. The future of the RES market is in providing supporting tools (e.g. subsides, tax refunds, financial incentives), which can make entrepreneurship more attractive and less risky.

1. Shortage of contractors

The market, technological, and economic barriers are causes of uncertainty for entrepreneurs as regards the long-term sustainability of the business. Therefore, they may consider the biomass business not to be very promising and decide to engage in other lines of business. This could result in a shortage of contractors in the RES market.

Economics barriers

Forest biomass lies scattered on the forest floor and it has to be collected from a large number of locations. Technically, logging conditions vary widely, and this variability is reflected in productivity, cost of work, and total production costs.

1. Cost of chips

The effect of the cost factors associated with the operating environment depends on the scale of operation, the technology applied, the source, and the quality requirements placed upon forest biomass. Cost reduction leaves room for manoeuvring in less favourable stand conditions, improves the profitability of forestry-machine enterprises, and makes it possible to pay a stumpage to the forest owners. Price reduction tends to have the reverse effect, although it does improve the competitiveness of chips against alternative fuels. Nevertheless, the still high investments into processing technology of forest biomass can influence efficacy of forest biomass use.

Logistical barriers

Forest chips differ from other fuels (for instance, peat and coal) with respect to their handling properties, including particle size distribution, bulk density, moisture content, and other properties. The heterogeneity and variable properties of forest chips are not always given the attention they deserve in logistics planning.

1. Shortcomings in receiving and handling

Receiving, handling, mixing, and feeding in of wood fuels are problematic stages if the power plant is not set up for the specific properties of chips and chip trucks. A receiving station must include technology enabling rapid and undisturbed unloading of chip trucks. It is necessary to modify handling equipment, such as disc screens and conveyors, to cope with chips containing over-sized particles, impurities, and excessive moisture. As these operations are an essential aspect of a forest fuel production system, they have been given an important status in the Finland's Wood Energy Programme.

The trends in removing the barriers to the large-scale use of energy wood, especially forest chips, showed improvements in all other analyzed areas, except in their availability in proportion to demand, during the period 1995-2002 (Table 6).

Table 6. Evaluation of barriers to the large-scale use of forest chips in Finland.

Barrier/year	1995	2002
Excessive cost of chips	***	**
Uncertainty of chips supply	**	*
Shortcomings in receiving and handling	**	*
Unsuitability of boiler for chips combustion	**	*
Unsatisfactory quality of chips	**	*
Shortage of contractors	*	*
Availability in proportion to demand	*	**

*= Barrier; **= Major barrier; ***= Very serious barrier
Source: VTT Technical Research Centre of Finland, 2003

6.3 Analysis of barriers to energy wood utilization in Slovakia

The barriers in Slovakia can be divided into the following: market barriers, technological barriers, and informational and legislative (administrative) barriers (Stratégia vyššieho využitia obnoviteľných prírodných zdrojov energie v SR, 2007. Ministerstvo hospodárstva SR).

Market barriers

1. Long-term stable conditions lacking in feed-in tariff system for electricity generated from RES

The main market barrier for business companies is that investors do not have assurances of long-term prices specified by minimum prices for RES-generated electricity purchases. Due to lack of feed-in tariff guarantees, banks are not willing to finance capital-intensive projects. Heating plants are faced with another obstacle in concluding long-term contracts with biomass producers regarding guaranteed prices for biomass over a sufficiently long period.

2. Lack of supporting measures for households

The most important market barrier for households is the absence of a financial incentives system and favourable loans for financing capital expenditures when converting their boiler systems to use RES. Although the payback period has been shortened by increasing prices of fossil fuels and electricity, it is still a long time before these investments are paid back. This barrier relates mainly to conversion of gas boilers to biomass boilers. This is why the return to biomass-based heating is taking place so slowly even in rural areas where the conditions are the best as regards biomass availability. The costs of investing into new technologies are often compared with conventional costs without considering the operating costs, the impact on environment, and the impact on promoting of employment.

Without appropriate support measures focusing on incentives for households to purchase technology utilizing RES, the development of RES utilization will be quite slow in Slovakia.

Technological barriers

The actual state of technology availability does not allow the utilization of all kinds of RES in their full extent. Most of the modern technologies are at the beginning of their implementation and require high investment costs.

1. Technological development of technologies utilizing RES

The highest costs are associated with technologies under technical development. For example, photovoltaic technology is at least twice as costly as technologies utilization other forms of RES.

2. Dependence of RES utilization on natural conditions

This attribute of RES can be considered to be a barrier in certain cases, e.g. due to seasonal and short-term variability of climate conditions. In the case of major and sudden deviations, it can have an impact on the safety and delivery of electricity into the supply system.

Informational barrier

1. Insufficient public awareness of the advantages and disadvantages of RES

A systematic approach in missing in raising public awareness at the local, regional and national levels, and this is holding back an increase in the interest of the public in using RES.

2. Insufficient training of experts for RES

There is not adequate system for training new experts and the re-qualification of persons interested in RES.

3. Insufficient implementation of new knowledge in practice and in education

The connection of science and research with the production sphere in the use of RES is very weak. Insufficient application of new knowledge in educational processes at all levels of education is related also to low public awareness. An important part of state support should include campaigns for raising awareness about the negative impacts of fossil-fuel-based heating and the positive impacts of utilization of other energy resources.

4. Poor implementation of regional concepts for RES utilization

The regions have not sufficiently implemented their own concepts of RES utilization based on analysis of the potentials of RES and the possibilities for RES utilization.

Legislative barriers

New Acts No. 656/2004 on the Energy Sector and No. 658/2004 on the Regulation of Grid Sectors were adopted in the Slovak Republic in 2004 supporting RES-based generation of electricity.

The legislative and administrative barriers to be eliminated by amendments of the existing legislation are as follows:

1. Lack of long-term stable conditions for feed-in tariffs of generated electricity

Despite the introduction of some new tools in RES utilization, the risk connected to unknown long-term conditions still exists. The return on investment extends as far as up to 15 years. Without long-term guarantee of stability in the market conditions, investors take high risks, which are seldom accepted by banks or by other investment institutions. Banks give credits usually for at least of 15 years in the majority of projects.

The Regulatory Office of Grid Sectors approved in April 2008 a method for determining the purchase prices of electricity generated from renewable energy sources for a period of not more than 12 years. But in some EU countries this support is up to 15 years and more. For instance, in the Czech Republic has 15 years, in Hungary 15 years, and in Germany, Spain and Italy for 20 years.

2. Lack of legal duty of purchasing electricity from RES

The obligation to purchase RES-generated electrical energy is an essential aspect of market stability. Such an obligation is not guaranteed by legislation in Slovakia, only by Government Regulation No. 124/2005 pertaining to the rules of the electricity market behaviour where the obligation is placed on grid operators to purchase RES-electricity preferentially to cover grid losses. The lack of a direct legislative obligation gives potential investors and banks ground for doubting as to whether RES-generated electricity finds consumers, especially because of its higher price.

Box 7 shows list of the barriers in both countries. The list is based on the barriers identified in a particular country, but this does not mean that barriers of one country can not be considered to be barriers in the other country. In addition, it should be borne in mind that also the common barriers valid for EU Member States have to be taken into account in this examination (Box 6).

BOX 7

Energy wood market barriers in Finland and Slovakia

Finland	Slovakia
Market barriers:	
1. Uncertainty of chip supply	1. Lack of long-term stable conditions in feed-in tariff system for RES-generated electricity
2. Availability in proportion to demand	2. Lack of supporting measures for households
Technological barriers:	
1. Unsuitability of boilers for chip combustion	1. Technological development of technologies utilizing RES
2. Unsatisfactory quality of chips	2. Dependence on natural conditions when utilizing RES
Business barrier:	*Informational barriers:*
1. Shortage of contractors	1. Inadequate public awareness of advantages and disadvantages of RES
	2. Inadequate training of RES experts
	3. Inadequate implementation of new knowledge in practice and in education and training
	4. Poor implementation of regional concepts for RES utilization
Economics barrier:	*Legislative barriers:*
1. Cost of chips	1. Absence of long-term stable conditions for feed-in tariff of generated electricity
	2. Lack of legal obligation to purchase RES-generated electricity
Logistical barrier:	
1. Shortcomings in receiving and handling	

Source: VTT Technical Research Centre of Finland, 2003; Ministry of Economy of the Slovak Republic, 2007

7 SWOT analysis of the energy wood market

The SWOT analysis approach is quite a practical way of studying the feasibility of technologies, market actions or other relevant matters in several areas. In order to eliminate subjectivity in the analysis of strengths, weaknesses, opportunities and threats affecting the energy wood market in the chosen countries, the SWOT analysis conducted here is based on the outcomes of several national and international projects carried out by other authors in combination with the personal opinion of the authors of this study.

7.1 SWOT analysis of the energy wood market in Finland

A SWOT analysis of forest biomass in Finland was carried out within the EUBIONET II project, which has been funded by the Intelligent Energy Europe (IEE) Programme of the European Commission.

The following strengths, weaknesses, opportunities and threats were identified as affecting entrepreneurship in the forest-based energy business sector:

Table 7. SWOT analysis of forest biomass in Finland.

Strengths	Weaknesses
– *High level of forest biomass potential* – *Tradition of using wood-fuels for heating* – *Development of CHP/DH using forest biomass* – Machines and special tools – Practical know-how – Ability to take risks – TAFFEC	– Heavy loan burden – Inadequate marketing skills – Inadequate cost accounting skills – Poor co-operation among entrepreneurs
Opportunities	**Threats**
– New business models – New entrepreneurial generation	– Over capacity – unsustainable investment subsidy policy – Oligopsonistic market model – too few buyers of machine services and traditional business models – Unstable subsidies policy – Fettered creativity – *Global warming* – *Global financial crisis*

Source: Wood fuel production - EUBIONET II, 2005, text in italics updated by authors in September 2008

Strengths and opportunities:

Finland has high potential in regard to its resources of forest biomass of which only about 19% are currently used for energy generation (Figure 23). This country has a long tradition in using wood-based fuels for heating and the use of forest biomass in CHP/DH was implemented many years ago.

The harvesting and processing of logging residues for energy generation is an attractive business for entrepreneurs at the moment. This business is quite profitable without subsidies and the average price of forest chips for the supplier at the energy plant's storage facility is approximately € 12 /MWh (Metla, 2007).

Machinery entrepreneurs are suppliers of machinery services such as chipping and bundling involving specialized knowledge. Their customers include the Forest Owners Association, bioenergy companies, forest-industry companies, and others. Building upon this, entrepreneurs have become suppliers of forest chips, energy, and machinery service to various customers.

Forest-based energy generation and small-scale direct selling are new choices and challenges for machinery entrepreneurs. Interest in this business is growing and is expected to dominate as a business choice in the future.

The Trade Association of Finnish Forestry and Earth Moving Contractors (TAFFEC) is an association for machinery contractors in the bioenergy, earthmoving, and forestry machine fields. TAFFEC endeavours to improve its members' skills and knowledge through training, information dissemination, and development projects. This includes developing tools to facilitate efficiency, e.g. computer programs, guides, and quality systems. TAFFEC also facilitates commercial collaboration among its members and even leisure-time activities.

There are many opportunities in the forest-based energy business for entrepreneurs including the range of different forest-based energy fuels, procurement methods, and business models available. These entrepreneurs have a key role to play in the forest-energy value chain. Their interest in the forest-energy business has increased because they see opportunities for profitable business with the risks being reasonable.

Weaknesses and threats:

Inadequate utilization of market niches in using renewable sources as forest biomass is connected to poor co-operation among entrepreneurs due to the weak marketing skills of the entrepreneurs, all of which hampers the development of the business environment.

The other weaknesses include heavy loan burdens, unsustainable investment subsidy policies, and the entrepreneurs' inadequate cost accounting skills.

The harvesting and processing of young forest stands for energy is a potential business sector for entrepreneurs, but the business models for this sector are still undeveloped. The profitability of harvesting young stands depends on the level of subsidies and this constitutes a risk for entrepreneurs.

The harvesting and processing of stumps for energy is another potential business sector for entrepreneurs, but under-developed power plant technology limits this business to small-scale plants (boilers with capacities under 5MW).

The other threats include unstable subsidies policy, fettering of creativity in the promotion of utilization of renewable sources, and global warming and its impact on forests. A fresh issue is the global financial crisis and the impact it is having in all countries and in all sectors of the economy.

The results of the SWOT analysis presented here indicate that the future of the forest-energy business lies in energy companies owned by machinery entrepreneurs in partnership with forest-industry companies. The only way to set up a sustainable forest-energy business is through a partnership approach involving all parties.

7.2 SWOT analysis of the energy wood market in Slovakia

A SWOT analysis of forest biomass use for energy generation was carried out by the Ministry of Economy of the Slovak Republic and its results were published in the Strategy of Higher Utilization of Renewable Energy Sources in the Slovak Republic.

Table 8. SWOT analysis of forest biomass in Slovakia.

Strengths	Weaknesses
– *High level of forest biomass potential* – The most promising energy source – The most available potential – Negligible sulphur content and solid pollutants by biomass combustion in comparison to coal (approx. 0.01%)	– Transport costs/logistics – Necessity of storage due to seasonality of cultivation and use – Necessity of reliable delivery guarantees of biomass in the long term
Opportunities	**Threats**
– Decreasing dependency on import of fossil fuels – Development of rural areas and improved employment situation – Job opportunities in production and supply of biomass – Development of new disciplines (e.g. biotechnologies)	– Increase in biomass prices due to higher demand – Increase in transport costs of biomass – Shortage of biomass due to insufficient elasticity of supply – *High density of natural gas grid also in regions with highest biomass potential* – *Global warming* – *Global financial crisis*

Source: Stratégia vyššieho využitia obnoviteľných prírodných zdrojov energie v SR, 2007, *text in italics updated by authors in September 2008.*

Strengths and opportunities:

Slovakia has high potential in regard to forest biomass. However, only about 10% of the biomass is currently used for energy generation (Figure 27). It is the most promising renewable energy source. It accounts for more than 59% of all RES. One of the major features of biomass is its negligible content of sulphur and solid pollutants in comparison to coal (approx. 0.01%). Biomass is considered to be neutral as regards its CO_2 emissions, which is essential in the endeavour to achieve the target set up by the Kyoto Protocol for Slovakia to decrease CO_2 emissions by 8%. This is also strength common to all energy wood markets.

The use of biomass for energy generation provides an opportunity for reducing the dependency on import of fossil fuels. It also contributes to promoting employment in regions with high unemployment rates, these regions being also regions with high concentrations of useful biomass potential. This is a great opportunity for entrepreneurs or investors, not only in the energy sector, but also in the rural business. Moreover, it provides preconditions for the development of new disciplines, e.g. biotechnologies and new technologies.

Weaknesses and threats:

High transport costs and complicated logistics solutions are still the prominent problems in forest chips production. The number of storage facilities and logistics centres related to distribution of forest biomass is very low. The necessity of storage due to the seasonality of cultivation and use is one of the biggest problems, and it is related to the necessity of guaranteeing reliable deliveries of biomass for CHP/DH on a long-term basis.

One of the threats focusing on the energy wood market is the rise in biomass prices due to the higher demand for RES-based energy. The increased transport costs (long-term average) of biomass and shortage of biomass due to insufficiently elastic supply are other threats. Slovakia has high levels of natural gas supply also in regions with the highest forest biomass potential, which makes the situation for using forest biomass for heating much more difficult. Supporting policies, including financial incentives or subsides, are especially lacking in these regions. Global warming represents a threat to the sustainability of forest use and thus also to the forest- biomass market and the utilization of this biomass for energy generations. The global financial crisis has to be taken into account in the strategies for using biomass in energy generation due to the reduced availability of loans for RES projects and the increased concerns in the banking sector related to the long payback periods of these investments.

7.3 Common SWOT analysis findings for Finland and Slovakia

The common opportunities identified for the two countries include the following:

- RESs are and will be continuously promoted by national and EU legislation
- High biomass potential for energy use and its low level of utilization
- Prices of natural gas, oil and electricity are likely to rise
- There is a broad range of biomass combustion technologies varying from micro-scale to large-scale production
- Rather strong position of industrial CHP provides opportunities for switching over from fossil fuels to biomass

The common threats identified for the two countries include the following:

- Entrepreneurs' weak marketing and cost accounting skills
- Poor co-operation among entrepreneurs
- Uncertainty in long-term policies for subsidies and heavy loan burdens
- Global warming and its consequences for sustainability of forest ecosystems
- Financial crisis makes the business environment more vulnerable and loans for new RES projects with long-term payback period much more difficult to obtain. Shortage of financial capital will mean less implemented projects

8 Analysis of the existing measures and tools supporting the utilization of RES

8.1 Analysis of the existing measures and tools supporting the utilization of RES in the EU region

The European Union has set its overall binding target of a 20% share of renewable energy sources in energy consumption and its binding 10% minimum target for biofuels in transport to be achieved by each Member State, as well as binding national targets by 2020 in line with the overall EU target of 20%.

The Member States are obliged to adopt national action plans to apply the measures removing the barriers and supporting the development of renewable energy use.

The Member States have currently different supporting systems, which can be classified into four groups: *feed-in tariffs, green certificates, tendering systems,* and *tax incentives*. These are described in the following text as published in the Communication from the Commission – The support of electricity from renewable energy sources (COM(205) 627 final):

Feed-in tariffs exist in most of the Member States. These systems are characterized by a specific price, normally set for a period of several years that must be paid by electricity companies, usually the distributors, to domestic producers of green electricity. The additional costs of these schemes are paid by suppliers in proportion to the volume of their sales and are passed through to the power consumers by way of a premium on the kWh-based end user price. These schemes have the advantages of investment security, the possibility of fine tuning, and the promotion of mid- and long-term technologies. On the other hand, they are difficult to harmonise at EU level, they may be challenged under internal market principles, and they involve the risk of over-funding if the learning-curve for each RES-E technology is not built in as a form of digression over time. A variant of the feed-in tariff scheme is the fixed-premium mechanism implemented in Denmark and partially in Spain. Under this system, the Government sets a fixed premium, or environmental bonus, paid above the normal or spot electricity price to RES-E generators.

Under the ***green certificate*** system, existing in Sweden, UK, Italia, Belgium, and Poland, RES-E is sold at conventional power-market prices. In order to finance the additional cost of producing green electricity, and to ensure that the desired green electricity is generated, all consumers (or in some countries producers) are obliged to purchase a certain number of green certificates from RES-E producers according to a fixed percentage, or quota, of their total electricity consumption/ production. The penalty payments for non-compliance are transferred either to a renewables research, development and demonstration (RD&D) fund or to the general Government budget.

Since producers/consumers wish to buy these certificates as cheaply as possible, a secondary market for certificates has developed where RES-E producers compete with one another to sell green certificates. Therefore, green certificates are market-based instruments, which have a theoretical potential, if they function well, of ensuring the best value for the investment. These systems could work well in the single European market and involve, in theory, a lower risk of over-funding. However, green certificates can pose a higher risk for investors and long-term, currently high-cost, technologies are not readily developed under such schemes. These systems involve higher administrative costs.

Pure ***tendering*** procedures existed in two Member States (Ireland and France). However, France has recently changed its system to a feed-in tariff combined with tendering system in some cases, and Ireland has just announced a similar move. Under the tendering procedure, the Government places a series of tenders for the supply of RES-E, which is then supplied on a contract basis at the price resulting from the tender. The additional costs generated by the purchase of RES-E are passed on to the end-consumer of electricity through a specific levy. While the tendering systems theoretically make optimum use of the market forces, they have are of the stop-and-go kind and not conducive to stable conditions. This type of scheme also involves the risk that low bids may result in projects not being implemented.

Systems based only on ***tax incentives*** are applied in Malta and Finland. In most cases (e.g. Cyprus, UK and the Czech Republic), however, this instrument is used as an additional policy tool.

The above categorisation into four groups is a fairly simple presentation of the situation. There are several systems that have mixed elements, especially in combination with tax incentives (or investment incentives).

Investment incentives also belong to support systems. They help to overcome initial problems with procuring investments. The sum provided can be non-repayable or interest-free with long-term payback period, mostly amounting to 5%-50 % of the total investment costs. In its extended application, it is necessary to accumulate large amounts of finance in the appropriate fund or budget category. The investment incentives are mostly used in combination with another support system or support form.

Assessment of the differences between the total money received for renewable energy generated and the generation cost points at the cost-efficiency of the different schemes. The wider the gap between "generation costs" and "support", the less cost-efficient the system is. Alongside the cost, the efficiency of the different support systems is also an essential parameter to be considered in the assessment. Efficiency refers to the ability of a support scheme to deliver green electricity.

In assessing efficiency, the effects of more recent systems are difficult to judge. In particular, the experience with green certificates is more limited than with feed-in tariffs. Moreover, the amount of green electricity delivered needs to be assessed against the realistic potential of the country in question.

Analyses of biomass sectors are not as clear as in the case of the wind sector. The generation cost of biomass shows great variability. This is caused by the following: different sources (forest residues, short rotation coppice, straw, animal waste, etc.), different conversion processes of transformation (co-combustion, gasification, etc.), and different sizes (existing sizes of biomass plants can vary by a factor of 200). Thus, far more precise analyses are needed, and they need to be based on specific feed-stocks and technologies.

In the biomass forestry sector, it cannot be concluded that one system is better than another (feed-in and green certificates). The complexity of the sector and the regional variability mean that other factors play strong roles. In general, incentives to forest harvesting should help mobilise more unused forest biomass for all users.

Although feed-in tariffs in general show better outcomes, since investor risks (where green certificates are concerned) seem to hamper the real take-off of the biomass sector, conducting an

analysis is more complex in the biomass forestry sector. Factors other than the choice of financial instrument (infrastructural barriers, installation sizes, optimal forest management, the existence of secondary instruments, etc.) considerably influence the efficiency of systems.

There is an urgent need for increasing information and awareness about the ***RES-H Sector*** (Renewable Energy Sources Heat), which is essential for reaching the EU target of 20% RES contribution to the gross energy consumption. It has become apparent that knowledge about the most suitable support policies for RES-H is still scarce. Support policies for RES-H tend to be weak and fragmented. A comprehensive approach to supporting RES-H does not exist yet (www.aebiom.org).

Due to the greatly varying potentials and developments in the different EU Member States regarding renewable energies, harmonisation appears to be very difficult to achieve in the short term. In addition, short-term changes to the system have the potential to disrupt certain markets and make it more difficult for Member States to meet their targets. Nevertheless, the advantages and disadvantages of harmonisation regarding the different current systems have to be analysed and monitored also, notably to ensure medium- to longer-term development (Communication from the Commission – The Support of RES-E, 2005).

Potential advantages

- The results of a number of studies suggest that the overall cost of complying with the RES-E target share in 2010 could be substantially lower with harmonisation of green certificates or feed-in systems than with the continuation of the present different national policies. However, a better functioning internal electricity market and a higher degree of interconnection and trade capacity are required to enable these cost-efficiencies to take place, and market distortions in the form of support for conventional energy sources should be eliminated.
- The integration of renewable energies in the internal market with a single basic set of rules could create the economies of scale needed for a flourishing and more competitive renewable-electricity industry.
- A Europe-wide green certificate scheme is likely to lead to a bigger and thus more liquid certificates market, which would result in more stable green certificate prices compared to smaller (national) markets. However, the administrative costs of such a system would need to be assessed against the administrative costs of the current systems.
- A Europe-wide common feed-in scheme taking into account the availability of local resources could drive down the costs of all RES technologies in the different Member States as installations are not restricted to certain Member States. Such a feed-in system could either consist of fixed tariffs or "premium" tariffs on top of a base price bound to the average price of electricity.

Potential disadvantages

- A harmonised green certificate scheme can work only if it results in appropriate certificate prices and penalties across the EU, and thus the most efficient build-up of RES installations in the various countries. Significant fluctuations in green certificate prices can lead to increased investor uncertainty and reduced build-up of RES.
- Considerably more information on the relevant technologies and costs are needed in order to optimise the tariffs and keep the costs low for a harmonised feed-in tariff system. Hence, if these issues are not managed properly, the system could risk becoming expensive and inflexible.

- Harmonisation via a green certificate scheme with no differentiation by technology would negatively influence dynamic efficiency. Since such a scheme would promote cost efficiency first, only the currently most competitive technologies would expand. While such an outcome would be beneficial in the short run, investment in other promising technologies might not be sufficiently stimulated through the green certificate scheme. Other policies would thus need to complement such a scheme.
- Member States that become importers of RES-E in a harmonised system may be unwilling to pay the bill if they do not profit from the local beneficial effects (employment and rural development, diversity, and thus security of indigenous energy supplies, and reduced local pollution) which would be achieved if the renewable energies were produced in their own territory.
- On the other hand, even the exporting countries might be unwilling to have more RES capacity than needed for their own targets, as this could create opposition within the population to future RES installations.

The Commission proposes a process for *the optimisation of national systems* and reminds us that the instability or ineffectiveness of systems normally translates into higher costs for consumers. Optimisation focuses on economic mechanisms and cost-effectiveness, but it also calls for the removal of administrative and grid barriers.

Member States are expected to optimise and fine tune their support schemes by the following means (Communication from the Commission, The support of electricity from RES, 2005):

By increasing legislative stability and reducing investment risk. One of the main concerns related to national support schemes is the possible stop-and-go nature of a system. Any instability in the system creates high investment risks, which normally take the form of higher costs for consumers. Thus, the system needs to be regarded as being stable and reliable by the market participants in the long run in order to reduce the perceived risks. Reducing investment risk and increasing liquidity are important issues, notably in the green certificate market. The designing of a support mechanism must minimise unnecessary market risk.

*By reducing administrative barriers***,** including the streamlining of administrative procedures. The administrative requirements for access support schemes should be reduced in order to minimise the burden on consumers. Clear guidelines, one-stop authorisation agencies, the establishment of pre-planning mechanisms and lighter procedures are concrete proposals to Member States in addition to the full implementation of the RES-E Directive.

By addressing grid issues and the transparency of connection conditions. Transmission reinforcement needs to be planned and developed in advance with appropriate financing. The Commission recommends, firstly, that the principles of cost bearing and sharing should be fully transparent and non-discriminatory. Secondly, the necessary grid infrastructure development should be undertaken to accommodate the further development of renewable electricity generation. Thirdly, the costs associated with grid infrastructure development should normally be covered by grid operators. Fourthly, the pricing for electricity throughout the electricity network should be fair and transparent, taking into account the benefits of embedded generation.

By encouraging technology diversity. Some support schemes tend to support only the strongest of the renewable technologies in terms of cost competitiveness. For instance, offshore wind energy would usually not be developed if it were to come under the same financial framework as onshore

wind power. Such schemes could, therefore, be complemented with other support instruments in order to diversify technological development. A good overall support policy for renewable electricity should preferably cover different renewable technologies.

By offering tax exemptions and cuts to renewable energy sources under the Directive on the taxation of energy products. This should be made better use of by Member States.

*By ensuring compatibility with the internal electricity market***.** EU Member States are in the process of liberalising their power markets. This criterion assesses the ease with which a support scheme can be integrated into a liberalised power market and its effectiveness in functioning together with existing and new policy instruments.

*By encouraging employment and local and regional benefits***.** A substantial part of the public benefits pursued by policies supporting renewables relate to employment and social policies, rural development, while other national policy goals should be respected and be duly taken into account.

By twinning with actions on energy efficiency and demand management. The progress of renewable electricity generation is being offset by excessive growth in electricity consumption and must be avoided. Only a combination of RES-E support measures with electricity end-use efficiency measures will bring Europe further along its path towards the set energy policy goals.

8.2 Analysis of the existing measures and tools supporting the utilization of RES in Finland

Following analysis of the available documents (*Renewable Energy Fact Sheet (2007), Renewable Energy Policy Review (2006), Report by Finland on Implementation of Directive 2001/77/EC (2007)* and *The share of renewable energy in the EU - Commission Staff Working Document (2004))*, the actual supporting measures for RES-E and RES-H&C utilization in Finland are divided into:

a) Legislative measures
b) Financial measures
c) Other measures

a) Legislative measures

The Long-term Climate and Energy Strategy delivered by the Finnish Government to the Parliament on 6 November 2008 is a basic document setting the targets for the use of renewable energy up to 2020 in accordance with the guidelines drawn up by the European Council in 2007. Sectoral objectives, such as the promotion of energy to be generated from renewable resources, are also integral part of this strategy. Moreover, the strategy strengthens Finland's commitment to the indicative target on the use of renewable energy for the generation of electricity.

Guaranteed access to the grid

The Electricity Market Act (385/1995) guarantees grid access to all electricity users and electricity-generating plants, including electricity generated from renewable energy sources.

Despite the operational environment created by the Electricity Market Act, it has been noted, especially in connection with small generating plants that their access to the grid and their transmission charges are such that the realisation of investments in small plants has been slowed down. As a result, the profitability of projects has suffered. The Electricity Market Act has been amended to improve the situation. The changes came into force on 1 February 2008. The amendment is designed to facilitate the access of small-scale electricity producers to the distribution grid, to promote combined heat and power production, and the use of biofuels and renewable energy sources.

A special provision was included in the Electricity Market Act regarding network service charges for the generation of electricity. This stipulates that distribution system operators may not include grid reinforcement costs in the connection fee for small-scale electricity generation. It further stipulates that transmission payments chargeable on the generation of electricity in the grid must cover a smaller portion of the grid costs than the transmission payments chargeable on electricity consumption. At the same time, it establishes a common framework for electricity generation transmission payments in electricity distribution networks.

Furthermore, a Government decree sets out detailed rules governing transmission charges for the generation of electricity and the way these are defined on the distribution network, as well as the threshold values to be imposed on the transmission charges for electricity generation proportionate to the amount of energy supplied. These must be complied with by the distribution system operators.

Guarantee of origin

The "guarantee of origin" system for electricity has been implemented in Finland by means of the Act on the Verification and Notification of the Origin of Electricity (1129/2003) and the Government Decree on the Verification of the Origin of Electricity (1357/2003). The guarantee-of-origin system will be extended in the near future, in accordance with the CHP Directive, to include CHP electricity more efficiently generated.

b) Financial measures

In respect of the available data, the financial measures of the RES market are assigned for electricity support and heating and cooling support (www.erec.fi).

Support for electricity

Finland's energy market is fully liberalised, right down to the level of the individual private consumer. Market support for renewable electricity consists of the following financial measures, i.e. investment subsidies, and tax refunds (Box 8).

Support for heating and cooling

Market support for renewable heating and cooling consists of the following financial measures, i.e. investment subsidies and fiscal incentives (Box 9).

In 2005, the introduction of emissions trading prompted changes to be implemented in the support schemes for renewable-energy-based electricity generation in Finland. The tax benefit for

electricity generated using wood and wood-based fuels, waste gas from metallurgical processes, and chemical reaction heat was discontinued in early 2007. Other electricity-generation subsidies, such as subsidies for wind power, small-scale HEP, recycled fuels, forest processed chips, and biogas, were retained (Report by Finland on Implementation of Directive 2001/77/EC, 2007).

New guidelines were introduced for Government benefits for investments in renewable energy in 2006. Under these guidelines, investment subsidies in the sector of emissions trading were suspended, except those targeted at innovative technology projects. Aid continues to be granted outside the emissions trading sector, including for investment projects using conventional technology.

The use of new support schemes or a possible extension will be reconsidered if the incentives created by emissions trading and the current scheme based on investment grants and tax benefits fail to sufficiently promote renewable energy. The rise in the market price of electricity and the rise in costs related to emission-producing fuels induced by the emissions trading scheme both clearly do more to improve the competitiveness of wood fuel than traditional investment grants and tax benefits. The new emissions trading period starting in 2008 is expected to further increase the price of electricity and thus further improve the competitiveness of electricity generated using renewable energy sources.

Electricity generated from renewable sources is being promoted in many EU countries by means of green certificates and feed-in tariffs based on compulsory purchasing.

BOX 8

Financial measures for electricity generated using renewable energy sources

Investment subsidies:

The construction costs of renewable energy plant are co-financed by the government. In the recent year's wood plants for energy and fuel production have been the ones mostly benefiting from this scheme (60 % of the total grants in 2006).

Tax refunds for suppliers of renewable electricity:

The government imposes a per kWh tax on all Finnish electricity suppliers, which they pass on to their end consumers. The government refunds this tax to suppliers of renewable electricity.

Source: Renewable Energy Policy Review - Finland, EREC 2008

BOX 9

Financial measures for heating and cooling generated using renewable energy sources

Investment subsidies:

The construction costs of a renewable-energy plant are co-financed by the Government with grants of up to 30%. This applies to companies. Direct investment support is reserved for individual biomass-fired heating installations.

Fiscal incentives:

Taxes imposed on heating energy are calculated on the basis of the net carbon emissions of the input fuels and for renewable energy sources they are zero.

Source: Renewable Energy Policy Review - Finland, EREC 2008

Finland's first feed-in tariff project for the generation of energy from renewable energy sources is the introduction of the feed-in tariff mentioned in the Government's programme for biogas plants with capacities under 20 MW. The scheme is to include plants using field biomass, slaughterhouse waste, various manures or municipal waste as fuel.

The EU's Structural Funds for the programming period 2007-2013 belong to the financial measures for financing projects utilizing RES (Figure 30). During the 2007–2013 programming period, Finland will fulfil the objectives of *Regional Competitiveness and Employment*, and *European Territorial Cooperation*. The Regional Competitiveness and Employment Objective highlight the need to focus on research, innovation, accessibility, and the creation of jobs. Investment in human capital is of major importance in adjusting to economic and structural change.

The European Territorial Cooperation objective and *the European Neighbourhood and Partnership Instrument (ENPI)* programme are aimed at reinforcing integration in border regions and in wider areas of cross-border cooperation, and to promote the creation and strengthening of inter-region and inter-city networks. During the 2007–2013 programming period, Finland will participate in nine European Territorial Cooperation programmes and three ENPI programmes.

The EU support provides additional funding for Finland's national development efforts. During the period 2007–2013, Finland will receive approximately 1.7 billion euros. In addition, the EU programmes will incorporate around 2.01 billion euros of national public funding (central government 75%, municipalities 25%) and an estimated 2.3 billion euros of private funding. The benefit drawn from the funds will be greater than their total sum, thanks to new models of operation and excellence created by the funded projects.

Finland's *National Strategic Reference Framework (NSRF)* sets out the objectives and focus areas for the delivery of funds for development projects. The NSRF and the ERDF operational programmes for 2007–2013 were adopted by the European Commission in September 2007.

The NSRF is implemented with the help of operational programmes. These set out measures in line with the NSRF focus areas, centring on those measures which offer the best support to national and regional development trends.

The Finnish NSRF is designed to strengthen national and regional competitiveness, employment, and well-being. The Structural Funds programmes will advocate measures which respond to increasing national and international competition, anticipate and react flexibly to changes in the world economy, create attractive business, skills, working and living environments, and narrow development disparities between areas. The NSRF takes account of regional characteristics, allocating measures in particular to the East and North of Finland, sparsely populated areas, and the challenging areas in the South and West of Finland. In cross-border cooperation, Finland's priorities focus on the Community's external borders (Finland/Russia), the northern regions and partnerships around the Baltic region.

The operational programmes under *the Regional Competitiveness and Employment objective* are designed to strengthen Finland's national and regional competitiveness, taking account of regional characteristics and the main principles of the cohesion policy. Strategic focus areas include improving the operating environment for competitive and innovative businesses, supporting businesses entering the international markets, networking, promoting balanced regional development, and advocating regional drivers, which will enhance the attractiveness of the areas involved.

The 2007–2013 structural funds, allocated under the Regional Competitiveness and Employment objective for Mainland Finland, amount to a total of 1,590 million euros, of which the share of the European Regional Development Fund (ERDF) will total 974.3 million euros, while the European Social Fund (ESF) will contribute 615.4 million euros.

The total funds for the operational programmes under the Regional Competitiveness and Employment objective will be drawn from structural funds, national public funding, and private funding. The ratio of structural funds to national public funds will be 50/50 in the ERDF operational programmes for the East and North of Finland and 40/60 in the ERDF operational programmes for the South and West of Finland. It is estimated that the central government will allocate a total of 842.2 million euros to the aforementioned ERDF programmes over the programming period.

The European Regional Development Fund (ERDF) finances projects fostering entrepreneurship, innovation, regional skills structures, and R&D activities.

Measures under the EU's Structural Funds will be carried out in the Member States as part of the National Strategic Reference Framework (NSRF) operational programmes. In Mainland Finland, four large-scale ERDF operational programmes will take place during the 2007–2013 programming period: Southern Finland, Eastern Finland, Western Finland, and Northern Finland. The operational programmes were ratified by the European Commission between 27 and 28 September 2007. They will implement the Finnish NSRF for 2007–2013, adopted by the Commission on 12 September 2007.

The European Social Fund (ESF) operational programme for Mainland Finland for 2007–2013 is nationwide. The ESF Operational Programme is divided into national and regional sections. A total of 1.4 billion euros will be available for the 2007–2013 programming period, of which the ESF's share will amount to 615 million euros. In addition to the ESF, funds will be contributed by central and local government, and the private sector. Some 799 million euros of national public funding have been allocated for the programme. These funds will be distributed over seven years and across several authorities.

The European Territorial Cooperation objective is divided into programmes for cross-border, transnational and interregional cooperation. They aim to reinforce integration in border regions and in wider areas of cross-border cooperation, and to promote the creation and strengthening of inter-region and inter-city networks.

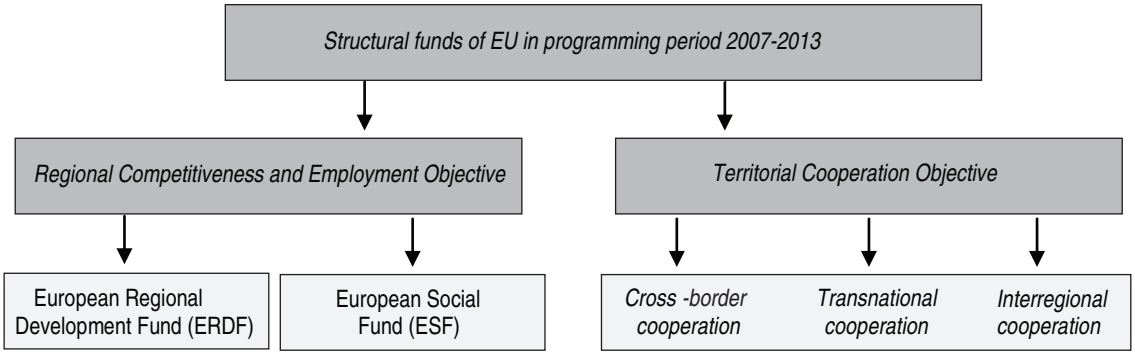

Figure 30. Regional and structural policy of Finland based on EU policy.
Source: www.tem.fi

The total EU budget for the European Territorial Cooperation objectives amounts to 7.75 billion euros for the 2007-2013 programming period, provided by the European Regional Development Fund (ERDF) based on the following financing plan:

- Cross-border cooperation: 5.576 million euros, plus 200 million euros to the Peace programme
- Transnational cooperation: 1.581 million euros
- Interregional cooperation: 392 million euros

The agreement scheme for the municipal sector has two alternative agreement models. Large and medium-sized municipalities can join a bilateral energy efficiency agreement between the Ministry of Employment and the Economy and the municipality in question. Small companies can adhere to an energy programme managed by Motiva Oy, which the municipality can join by signing the accession document. The energy efficiency agreement with the Ministry of Employment and the Economy can be signed by a town or municipality with more than 5,000 inhabitants and federations of municipalities with energy consumption exceeding 20,000 MWh per year. Towns or municipalities with 5,000-20,000 inhabitants and federations of municipalities with energy consumption between 5,000-20,000 MWh per year can choose between an energy efficiency agreement and an energy programme.

The model for energy efficiency agreements was drafted by experts from the Ministry of Employment and the Economy, Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu, and Motiva Oy. The municipal energy programme was drafted by the Ministry of Employment and the Economy, the Association of Finnish Local and Regional Authorities, and Motiva Oy.

Responsibility for the preparation of the energy efficiency agreement for the distribution of heating and transport fuels sector (HÖYLÄ III) lay with the Finnish Oil and Gas Federation, the Oil and Gas Heating Federation, the Federation of Finnish Petrol Retailers and Transport Service Providers (SBL), and Öljyalan Palvelukeskus Oy. The other signatories of the energy efficiency agreement are Neste Marketing Ltd, Oy Shell Ab, St1 Oy, Suomalainen Energiaosuuskunta (SEO), and Oy Teboil Ab.

c) Other measures

TEKES, the Finnish Funding Agency for Technology and Innovation, has been running and has just completed the Distributed Energy Systems Technology Programme (DENSY). As part of the programme, low-capacity systems for energy conversion, production and storage have been developed, along with the related services. Research has been carried out into, for example, the connection of distributed energy production to the grid. One of the products developed for this purpose is a simulation environment (software). In sparsely populated areas, the distributed production of electricity may safeguard the supply of electricity and generally reduce grid disruptions.

TEKES is currently running ClimBus, a wide-ranging technology programme focusing on business opportunities associated with controlling climate change. The programme covers the period 2004–2009, and its total budget is estimated at around 70 million euros. One of the main areas of study relates to clean energy production and fuels. The main sub-areas are replacement of coal with renewable energy sources in energy generation (technology, products, overall concepts and services which increase the share of biomass in existing coal-dust boilers or which replace

coal-based energy production with new technology), improvement of the efficiency and power-to-heat ratio of energy generation (including the development of new solutions in boiler technology in order to improve the efficiency of electricity generation and new electricity generation solutions based on gasification of biomass) and management of the bio-energy production chains (development of operating models and of support services and techniques in order to improve the management of the entire bio-energy chain and thus cost-efficiency on markets that are central to Finnish businesses).

8.3 Analysis of the existing measures and tools supporting the utilization of RES in Slovakia

Following analysis of the available documents (*Renewable Energy Fact Sheet (2007), The Strategy of Higher Utilization of Renewable Energy Sources in the Slovak Republic (2007), Report by Slovakia on Implementation of Directive 2001/77/EC (2007), The share of renewable energy in the EU - Commission Staff Working Document (2004)* and *Overview of Possible Financial Resources - Ministry of Economy of the Slovak Republic (2008)*, the actual supporting measures for RES-E and RES-H&C utilization in Slovakia are divided into the following:

a) Legislative measures
b) Financial measures and
c) Other measures

a) Legislative measures

Directive 2001/77/EC was implemented by laws and regulations adopted in 2004 and 2005. Laws and regulations adopted in that period and their amendments still constitute the basic legal framework for increasing the generation of electricity from renewable energy sources. The support mechanism within this framework is the obligation to purchase RES-generated electricity, fixing of purchase prices of such electricity, and its preferential transmission and distribution. The following legislation has governed RES promotion as of 31 October 2007:

- Act No. 656/2004 Coll. on Energy Sectors and on amendments to certain acts, as amended
- Act No. 276/2001 Coll. on Regulation in Network Industries and on amendments to certain acts, as amended
- Government Regulation No. 317/2007 Coll., laying down the electricity market rules

With effect on 1 April 2008, the Regulatory Office for Grid Sectors stipulated a method for the determination of purchase prices of electricity generated from renewable energy sources for a period of not more than 12 years.

Licences for engaging in entrepreneurship in the field of energy generation are not required for electricity generation and delivery when using renewable resources and a generation facility with total installed power up to 1 MW in the case of electricity generation and delivery using equipment designed for biomass utilization (Act No. 656/2004 Coll. On Energetics and on amendments to certain acts is amended by Act No. 112/2008 Coll. of 14.2.2008).

Act No. 275/2001 Coll., as amended, stipulates that the generation of electricity from renewable energy sources is also subject to price regulation. Based on the above provision, the Regulatory Office for Grid Sectors annually issues feed-in tariffs for electricity generated from renewable energy sources.

Feed-in tariffs

A system of fixed feed-in tariffs has been in place since 2005. The prices for electricity generated from renewable energy sources are set for 2008 as fixed prices with 12 years as the period set for return on the investment as follows:

- Electricity generated from biomass combustion
  a) Purpose-grown biomass - 3,150 SKK/MWh
  b) Waste biomass for facilities put into operation before 1 January 2005 – 2,190 SKK/MWh
  c) Waste biomass for facilities put into operation after 1 January 2005 – 2,960 SKK/MWh
  d) Waste biomass from production of bio-ethanol – 3,600 SKK/MWh
- Co-firing of biomass or waste with fossil fuels
  a) For facilities put into operation before 1 January 2005 – 2,190 SKK/MWh
  b) For facilities put into operation after 1 January 2005 – 2,650 SKK/MWh

The aforementioned fixed prices for electricity generated from renewable energy sources will be applied based on the confirmation of the origin of the electricity. If a facility for the generation of electricity from renewable energy sources was purchased/built with the support of any form of state aid or a contribution from an EU fund, the fixed prices of electricity generated from renewable energy sources in a facility put into operation after 1 January 2005 will decrease in proportion to the amount of the state aid or EU contribution provided as follows:

a) Up to 30% of total acquisition costs by 4%,
b) Up to 40% of total acquisition costs by 8%,
c) Up to 50% of total acquisition costs by 12%,
d) Over 50% of total acquisition costs by 16%,

Guarantee of origin

Guarantees of the origin of the electricity generated from renewable energy sources are issued, upon the request of the generating party, by an independent authority - the Regulatory Office for Grid Sectors. The reliability of the guarantees of origin is ensured through Government Regulation No. 317/2007 Coll., laying down the electricity market rules. A guarantee of origin issued in another EU Member State is valid in Slovakia.

Guaranteed access to the grid

Under the Energy Act, a party generating electricity using renewable energy sources enjoys the right of preferential electricity transmission, distribution, and supply if the generating facility designed for the generation of electricity from renewable energy sources meets the technical and commercial terms and conditions.

Distribution of electricity

Under the Energy Act, a party generating electricity using renewable energy sources enjoys the right of preferential distribution of electricity if the generating facility designed for the generation of electricity using renewable energy sources meets the technical and commercial terms and conditions.

Preferential purchase of electricity produced from RES

System operators must preferentially purchase electricity generated using renewable energy source in order to cover their losses.

b) Financial measures

It is necessary to apply financial measures supporting the private and public sectors. The Programme of Higher Utilization of Biomass (including solar energy) includes measures within the Structural Funds for households and for other sectors. It is also possible to integrate Environmental Funds into providing financial support amounting annually to SKK 30 mill. (€ 995,000) in the municipal sector.

In order that the targets set for the period 2007-2015 in the supply of heating energy might be reached, it is necessary to assure investment support for the utilization of biomass for heating of apartment houses and detached houses in a form of a subsidy for biomass boilers.

As households are not eligible to the support from EU Structural Funds, a *Programme of Higher Utilization of Biomass and Solar Energy by Households,* financed via the Government budget, has been launched. The subsidies will be assigned after the fulfilment of certain criteria. The Programme details, including conditions for subsidies from the Government budget, will be formulated in a directive to be issued by the Ministry of the Economy. The total amount of resources earmarked for one year is SKK 100 mill. (Box 10). It is envisaged that 1,000 devices will be installed annually at the average price of SKK 100,000 (€ 3,319). Annual resources from the Government budget amount, on average, to SKK 25 mill. (€ 829,000).

RES-H is promoted through the *Programme Supporting Energy Savings and Utilization of RES* (2003). It is aimed at creating a favourable climate for investments. Subsidies of up to € 100,000 are also available for the (re)construction of RES-H facilities. Tax exemptions are also granted for RES-E. This regulation is valid for the calendar year in which the facility put into operation and for the following five years.

It is necessary to integrate *Structural Funds of the EU during the programming period 2007-2013* among the financial measures assigned for financing projects for the utilization of RES.

RES support from Structural Funds will be possible via the Operational Programme of Competitiveness and Economic Growth (OPC&EG), which focuses on increasing energy efficiency (Boxes 11-13). All sectors of the national economy should support the public and private entities.

The general objective of this measure is to reduce industrial energy consumption through energy conservation and improved efficiency as well as by increasing the share of electricity and heat generation from RES to a level comparable with the average EU level. Support will be directed at programmes that lead to increased RES utilization and focused on conservation of energy and effective energy utilization. This means that the regions (Nomenclature territorial entity - NUTS

II), with exception of the Bratislava region, will be integrated into the Convergence Target and will be able to make use of the support provided through Structural Funds during the programming period 2007-2013 (Box 12).

It is necessary to focus the Structural Fund measures related to the public sector especially to biomass utilization. This will enable the transition to biomass-based heating (pellets, briquettes and chips) to be achieved at a speedy rate. It is also necessary to support refurbishing of boilers in school buildings and in institutions providing social services so that preference is given to biomass utilization.

The Priority Axis No. 2 of the Operational Programme for Competitiveness and Economic Growth includes measures for the energy sector, especially Sub-measure No. 2.1 Increasing the energy efficiency in production and consumption and implementation of progressive technologies in energy production. This is the most important part of OPC&EG for RES utilization. Box 13 lists the warrantable and non-warrantable outlays for entrepreneurs.

BOX 10
Programme of Higher Utilization of Biomass by Households - Direct support

Legal basis
Programme of the Ministry of Economy of the Slovak Republic created on the basis of Government Decree No. 383/2007 to the proposal of the Strategy of Higher RES Utilization in the Slovak Republic.

Support provider
The Ministry of Economy through the Slovak Innovation and Energy Agency

Support form – Direct support
The support for installed devices mentioned in this Programme is provided in the form of a grant, financial contribution, on the basis of application submission including the enclosure of officially authenticated copies of invoices or other relevant documents proving the purchase of the relevant equipment.

Support level:
The subsidy level for biomass boilers is assigned at 25% of the price of the biomass boiler for detached houses. The maximum subsidy should not exceed SKK 25,000.

Approved budget
The annual budget is set at SKK 100 mill. (€ 3.3 mill.) (including support for solar energy). These funds have not been allocated for year 2008 as yet.

Period during which support will be provided
The Programme will be in effect until the end of 2015.

Support beneficiaries
The Programme is targeted at households.

Source of detailed information
The Programme was approved by the Ministry of Economy of the Slovak Republic

Source: Overview of Possible Financial Resources - Ministry of Economy of the Slovak Republic, 2007

BOX 11
Operational Programme: Competitiveness and Economic Growth (OPC&EG) 2007-2013

Priority lines of the Programme	2 - Energetics
Measures	2.1 Increasing energy efficiency in generation and consumption, and implementation of progressive technologies in energetics
Contract authorities under managing authority (CA/MA)	Slovak Innovation and Energy Agency (SIEA)
Beneficiaries	Private and legal persons for entrepreneurship according to § 2 section 2 Code de commerce registered at the territory of Slovakia

Source: Overview of Possible Financial Resources - Ministry of Economy of the Slovak Republic, 2007

BOX 12
Financial Table for OPC&EG 2007-2013

Priority lines of the Programme	2 – Energetics
Measures	2.1 Increasing the energy efficiency in generation and consumption, and implementation of progressive technologies in energetics
Informative financial allocations (ERDF + Government budget)	€ 144,136,927
Intensity of direct support for beneficiaries	NUTS II West Slovakia - 40% NUTS II Middle and East Slovakia - 50%

Source: Overview of Possible Financial Resources - Ministry of Economy of the Slovak Republic, 2007

BOX 13
Priority Axis 2 - Energetics

Measure 2.1 Increasing the energy efficiency in generation and consumption, and implementation of progressive technologies in energetics

Eligible expenditures:

- Purchase of long-term tangible property whereby the price of self-moveable property is defined according to § 25 section 5 Act No. 431/2002 Coll. on accounting
- Construction of buildings exclusively related to the technology whereby the expenditures did not exceed 25% of the total warrantable expenditures of the project in the case of the Scheme *de minimis*,
- Refurbishing of buildings with the purpose of improvement their energy efficiency,
- Purchase of long-term intangible property whereby the purchase price for software, intellectual property, licenses, know-how or unpatented technical knowledge is defined according to § 25 section 5 Act No. 431/2002 Coll. on accounting and expenditures share of purchase long-term intangible property have to not exceeded 25% of total warrantable expenditures of the project.

Non-eligible expenditures:

- Interest on loans,
- Leasing,
- Insurance, fines and penalties,
- Fees for bank services, customs duties and taxes
- Shutdown of nuclear plant,
- Purchase of building land and realty,
- Building of new spaces,
- Purchase of vehicles and conveying devices,
- Purchase of used tangible property
- Simple substitution of outdated machines/instruments/devices with new machines/instruments/devices of the same efficiency,
- All personal expenditures,
- Operating costs,
- Expenditures of development of submitted project, paid VAT in case the beneficiary is a VAT payer in accordance with the valid regulations
- Marketing expenditures.

Assumed schemes of state support/ support *de minimis*
Scheme of state support for increasing energy efficiency in production and consumption and implementation of progressive technologies in energetics
Scheme for support of sustainable development (support scheme *de minimis*)

Source: Overview of Possible Financial Resources - Ministry of Economy of the Slovak Republic, 2007

The utilization of RES is supported also by the *Rural Development Programme of the Slovak Republic 2007-2013* via *Priority Axis 1: Improving the Competitiveness of the Agricultural and Forestry Sectors* with measure code 123 "*Adding Value to Agricultural and Forestry Products"*. The objective of this measure is to improve the primary processing and marketing of agricultural and forestry products by promoting higher efficiency, developing renewable energy sources, introducing new technology, and making use of new markets.

This objective is intended to be achieved in particular as follows:

- By introducing production of new products; new methods/technology;
- By improving product quality, their marketing and sales at new markets;
- By introducing and extending information and communication technology;
- By processing renewable sources of energy.

Investments can be designated for *forestry and RES*. In cases of investment in commercial forestry products based on the treatment of wood as a raw material, only activities preceding industrial processing are supported. Eligible activities in the primary processing sectors also include the following: *construction, refurbishing and modernization of production facilities, including access communications; procurement, refurbishing and modernization of machines and technology for primary processing of wood as a raw material, i.e. activities prior to the industrial processing of wood (primary and further wood production) and processing of non-wood forestry products (e.g. equipment for drying woodland herbs, facilities for treating forest fruit after harvesting, etc.,) and processing and exploitation of renewable sources of energy, machinery and facilities for the production of biomass (supported sectors: forestry).*

Description of the needs and aims with the focus on the overall efficiency of businesses for Supported Sector No. 10 – Forestry:

Future investments in this sector should go primarily into improving the equipment and technology of forestry businesses and thus improve the use of wood residues for the production of environmentally-friendly energy sources as well as the production of non-wood forest products. These investments can lead to a diversification of income for businesses working in this sector.

Description of the needs and aims with the focus on the overall efficiency of businesses for Supported Sector No. 11 – RES:

Support for processing material to produce renewable energy is in the country's interests, enabling it to follow EU commitments on the use of bio-fuels and biomass.

Eligible expenditures:

1. Investment in long-term tangible assets;
2. Investment in long-term intangible assets;
3. Own labour costs.

Final beneficiary (eligible applicant) in the case of forest products processing:

a) Natural and legal persons (micro-enterprises as defined in the Commission's Recommendation 2003/361/EC) managing forests and belonging to:
- Private owners and their associations,
- Municipalities and their associations,
- Churches, the property of which can according to the Slovak law be considered private as regards its administration and disposal. The owner has the rights and obligations enacted in the Commercial Code;

b) Natural and legal persons (micro-enterprises as defined in the Commission's Recommendation 2003/361/ES), providing services in forestry and tree-felling only to entities stated in item a).

Type of support

Type of support:	Non-repayable financial contribution
Way of financing:	Shared financing
Type of investment:	Profit

Aid intensities

The maximum support rate is limited to micro-enterprises, small and medium-sized enterprises as defined in the Commission's Recommendation 2003/361/ES. In the case of forestry, support is limited to micro-enterprises.

Maximum aid as regards total eligible costs:
- 50% (37.5% EU, 12.5% SR) for areas covered by the Convergence objective with at least 50% coming from own funds;
- 40% (20% EU, 20% SR) for other areas with at least 60% coming from own funds.

For enterprises not covered by Article 2 (1) of the Commission's Recommendation 2003/361/ES with less than 750 employees and a turnover of less than EUR 200 million, the maximum aid is halved.

Among other programmes and schemes of direct and indirect support for entrepreneurs within the OPC&EG (2007-2013) are the following:
- Act No. 561/2007 Coll. on investment support
- Support of Small and Medium Entrepreneurship (SME) via a network of incubators and implementation of a method called Research-based Spin-off
- Programme "Euro Info Centrum"
- National web domain for SMEs
- Programme of education, training and consulting
- Providing irreversible financial support from resources of the Innovation Fund

c) Other measures

The informational campaign *Informational Support Programme of RES* by regional agencies, on the Internet (focused on websites), training, brochures and media advertisement, belongs to other measures. The financial resources for the informational campaign are obtained from the Structural Funds or OPC&EG, mentioned as other programmes and schemes of direct and indirect support.

Due to the low level of awareness, it is necessary to realise an overall and long-term informational campaign at many levels using existing informational infrastructure and actively involved persons in this sphere. The campaign providers should be regional media with the support of public television (Slovak Television), Slovak Radio (SRo) as well as specialized journals and informational portals dedicated to living and life style.

The objective is to focus on selected targets groups:

- Individual users (households) and managerial companies using boilers for combustion of pellets, briquettes and chips,
- Agriculture and municipal sector for local heating and cogeneration on the basis of biogas and solid biomass heating,
- Small investors (groups of owners) for smaller projects

It is necessary to emphasize the RES topic in the *educational process* in comprehensive and secondary schools, to support implementation of new technological trends in RES utilization in comprehensive schools, and to profile selected technical, economic and scientific trends in RES application as well as energy conservation and increasing the energy efficiency of buildings and devices.

Facilitation of implementation of new technologies requires realising pilot or demonstrative projects on the use of renewable resources for energy. Support should be mostly directed at pilot projects oriented at public buildings, e.g. schools and offices.

Research projects in the area of RES have high potential for fast innovations and transformation of results into better and more efficient technologies. In addition to the traditional strong position of technical sciences, also the potential of natural and socio-economic sciences should be strengthened.

The effectiveness of Government support of research and development in RES technologies will be realised by implementing of the Government's research and development programme for technology support.

New long-term state scientific and technical policy should include utilization of RES among the priorities.

An overview of existing measures and tools supporting the utilization of renewable energy sources in Finland and in Slovakia is presented in Boxes 14 and 15.

BOX 14

Existing measures and tools supporting utilization of RES in Finland

Background

The main core of Finnish renewables policy is defined in the Action Plan for Renewable Energy. The most important objective is to increase the future competitiveness of RES. The plan places a strong emphasis on R&D activities to achieve this result in the long term. Energy taxation of fossil fuels forms the main instrument in the implementation of renewables in the short term.

RES targets

The RES-E target from the EU directive for Finland is 31.5% of gross electricity consumption in 2010 with the target for the share of energy generated from RES being 38% in the final consumption of energy in 2020.

Status of renewable energy market

Renewable energy sources account for around 24% of Finland's total electricity consumption (2006) supplied from two key sources: hydro-power (52.2%) and biomass (47.1%). The share of RES in the final energy consumption reached 28.5% in 2005.

Main supporting policies

Small-scale Production and Use of Wood fuels – RD&D Programme
DENSY - RD&D Programme
Action Plan for RES
Action Plan for RES – H (direct measure)
Energy Aid (direct measure)
Structural Funds of EU during the programming period 2007-2013
Exemption from energy tax for electricity generated from renewable energy sources. Unlike electricity generated from fossil or nuclear sources, electricity generated from renewable energy sources is exempted from the Finnish energy tax paid by end-users. This brings the following benefits for renewables (2004): *biomass / mini-hydro € 42 /MWh, biomass heating fuels € 1 /GJ (compared to natural gas)*
Subsidies for technological processes applied in early thinnings: *logging – € 7 /m^3, chipping – € 4.25 /m^3*
Tax refunds and investment subsidies available for new investments, which receive a subsidy of 40% for wind and 30% for electricity generation from other RES.

Main legislative measures

Guarantee of origin
Guaranteed access to the grid

Main financial measures

- For electricity generated from renewable energy sources: Tax exemption combined with investment incentives
- For heating and cooling generated from renewable energy sources: Investment subsidies; Fiscal incentives

Other measures, policies and schemes

TEKES, the Finnish Funding Agency for Technology and Innovation
Programmes managed by Motiva Oy, VTT, ADATO Energy Oy

Key factors

Increased demand for wood-based fuels (e.g. forest chips, pellets, briquettes) is reflected in the increase in their prices. On the other hand, the global financial crisis and global climate warming present considerable threats to the global RES market. Tax exemptions help to bridge the gap with fossil and nuclear competitors. Nevertheless, in the case of wind energy, the available support is not enough. The existing support systems have enabled a substantial increase to be achieved in the use of biomass for electricity generation and district heating. Finland's climate and energy strategy is being prepared in accordance with the Government's plan setting targets for the use of renewable energy up to the year 2020 in accordance with the guidelines drawn up in the spring of 2007 by the European Council. The preparation of the scheme began in the summer of 2007, and the intention was to have the bill submitted to Parliament during the autumn of 2008.

Sources: Commission Staff Working document - The share of renewable energy in the EU, 2004; MVV Consulting – Final Report, 2007;

updated in 2008

BOX 15

Existing measures and tools supporting the utilization of RES in Slovakia

Background

The core of the renewables policy is in the Action Plan of biomass utilization for 2008-2013 and in the Strategy for Higher Utilization of Renewable Energy Sources in the Slovak Republic.

RES targets

The RES-E target from the EU directive for Slovakia is 31% of gross electricity consumption in 2010 and 14% share of energy from RES in the final consumption of energy in 2020.

Status of the renewable energy market

Renewable energy sources account for around 16% of Slovakia's total electricity consumption (2006) supplied from two key sources: hydropower (92%) and biomass (7.7%). The share of RES in the final energy consumption reached 6.7% in 2005.

Main supporting policies

Strategy for Higher Utilization of Renewable Energy Sources in the Slovak Republic
Action Plan for Biomass Utilization for the Years 2008-2013
Operational Programme for Competitiveness and Economic Growth 2007-2013
Structural Funds of EU during the Programming Period 2007-2013
Rural Development Programme of the Slovak Republic 2007-2013
Programme Supporting Energy Savings and Utilization of RES-H
Environmental Fund

Main legislative measures

Feed-in tariffs
Guarantee of origin
Guaranteed access to the grid
Electricity distribution
Preferential purchase of electricity produced from RES

Main financial measures

Tax exemption
Investment subsidies

Other measures, policies and schemes

Support of Small and Medium Entrepreneurship (SME) via a network of incubators and implementation of a method called Research-based Spin-off
Programme "Euro Info Centrum"
National website for SMEs
Programme of education, training and consulting
Providing of irreversible financial support from the resources of the Innovation Fund

Key factors

The increased demand for forest biomass (mostly forest chips) is reflected in the rise in the prices of forest chips as a renewable energy source. On the other hand, the global financial crisis and global warming present considerable threats to the global RES market. Support for biomass utilization is developed by means of approved programmes by the Slovakian Government, but there are still many market barriers, legislative barriers and informational barriers. Nevertheless, there has been development in CHP and DH processes using forest biomass in recent years. Regarding the high potential of unused biomass, the Government prioritises biomass investments in remote, mountainous, and rural areas more than other renewables, e.g. wind or solar energy.

Source: Commission Staff Working document - The share of renewable energy in the EU, 2004; updated in 2008

9 Outline of the specific policy tools for achieving the strategic objectives in RES utilization in Finland and Slovakia

The utilization of renewable energy sources has developed quite rapidly during the past few years. As it is a new branch of the energy sector, higher uncertainties and risks can be expected in the implementation of new projects when compared to conventional heating and cooling technologies. Therefore, a sound policy should lower the risks connected with investing in RES, i.e. reduce the investment costs, increase the technical performance and reliability, and secure supply at low price risks, particularly in the case of biomass fuels.

In order to avoid these risks, a sound policy must be put in place to provide a stable framework of conditions. According to some published analysis results (Heating and cooling from renewable energies: Costs of national policies and administrative barriers, MVV Consulting - Final Report, 2007), such a policy should be:

- *efficient* (i.e. the benefit/cost ratio should be high, a measure could be RES-H expressed in toe per € spent through the policy)
- *effective* (i.e. the support scheme should yield a high market deployment of RES-H, a measure could be the exploitation of the potential in per cent)
- *sustainable* (i.e. the technology supported by the policy should deliver the expected results over the lifetime, and fuels (biomass) should be available at a low price risk over the lifetime)
- *monitorable* (i.e. there should be targets and indicators of achievement in order to enable conclusions to be drawn about the efficiency and effectiveness of the policy)
- *revisable*, in order to adapt measures and instruments to become more efficient and effective on the basis of the monitoring results.

Efficiency and effectiveness are improved if the policy is targeted at the specific group of RES users. If the targets are to be met in a specified time, attention should be given to the speed of effectiveness of a policy. A sound policy should have low information costs, low transaction costs, and low administrative costs in order to use all resources for the reduction of the risks associated with RES investments.

The assessment of selected RES policies shows that there is no single policy, which is superior in its effectiveness. The formulation of policy measures and the preparedness of the market appear to be important for the effectiveness of the policy.

Based on the analysis of the classification of policy tools published by *MVV Consulting – Final Report (2007)* and *the Support of Electricity from RES (2005),* an overview of policy tools and their activities supporting the use of RES was drafted and it is presented in Table 9.

The outline of policy tools is divided into financial and administrative tools (measures) and their activities (provided by the mentioned tools) pertaining to particular beneficiaries (enterprises, populations and municipalities) and directions. The activities of the financial tools (incentives) include project co-financing, providing of tax credits, contributions for education, etc. The activities of the administrative tools (measures) include business start-up regulation, investment regulation, compliance of proposed obligations (quotas), etc.

The promotion strategies and policy tools supporting RES include sets of different measures, tools and activities, which are classified in several ways. As mentioned above, the proposed policy tools are classified according to the following criteria:

- Type of beneficiaries as enterprises, populations and municipalities,
- Direction spheres they are referred to support activities, for instance: the technology phase with support for technology development, the act of purchasing and installation (investment), or the operation of installed equipment (e.g. heat and power generation) etc.,
- Leverage: support is giving directly or indirect incentives for the promotion of RES within the administrative tools, and
- Financial incentives or quantitative obligations within direct support schemes.

Table 9. Proposal of policy tools and its activities for supporting wood utilization as RES.

Beneficiary/Goals	***Policy tools /Activities***	
	Financial tools (incentives)	***Administrative tools (measures)***
Enterprises		
Business start-up	Venture capital "starting help" Co-operational motivation	Business start-up regulation
Technologies, Innovations, Development	Co-financing projects of implementation new technologies and research-developing innovations	New technologies regulation
	R&D funding	R&D demonstration *and programmes*
New job opportunities	Projects' co-financing	*Employment measures*
Investments	3rd Party Finance (soft loans) Capital Grants Consumer Grants/Rebates Investment Tax Credits Sales Tax Rebates Tax Credits Government Purchases Green Pricing	Investment regulation *Obligations (quotas)* *General energy policy targets* *Fossil fuel taxes*
Operation	Property Tax Exemptions Guaranteed prices/Feed-in Tradable Certificates Voluntary Programmes	*Voluntary agreements* Regulatory and Administrative Rules Obligations (quota)
Mobility	Location support	Location orders and prohibitions
Populations		
Education	Contributions for education	*Public awareness*
Mobility	Contributions for mobility	-
Delivery	Subsidies for nearby suppliers	-
Municipalities, institutions		
	Contributions for communal and regional developing projects	Coordination of municipalities and regional institutions

Source: Heating and cooling from renewable energies: Costs of national policies and administrative barriers, MVV Consulting - Final Report, 2007; *updated and modified by the authors in 2008*

The comparison of different policy tools illustrates that it is difficult to establish criteria for the identification and selection of best practices. Best practices are usually derived from case studies and are defined using a heuristic approach. Table 10 shows the principles of these best practices and how often these principles have been identified in different studies.

These best practice principles also coincide with the criteria of a sound policy. All best practice principles should result in effective and efficient policies, and the continuity principles correspond with the sustainability criterion, while the monitoring and revision criteria are reflected by the best practice principles of a clear message /target and fair amounts of incentives.

When proposing policy tools and their activities, it is necessary to give an overview about the existing policy tools, their functionality, and impacts. A comprehensive source for support measures is also *IEA Global Renewable Energy Policies* and *Measures Database (*www.iea.org/textbase/pamsdb/grindex.aspx). This database has been compared with and has been extended

Table 10. Best practice principles.

Description	Frequency in studies
Continuity	
Support schemes should be planned for several years with conditions as stable as possible, reducing the investment risk for investors planning horizons. Potential investors must not end up in a position where they postpone their investments, because they expect better support in the future. To guarantee long-term sustainability, sufficient funds must be available.	♦♦♦♦♦♦♦
Coherence and comprehensiveness	
The measures within any support scheme need to be carefully designed in order for them to be coherent and complement on another. Coherency also includes flanking measures such as awareness campaigns and training of installers. Comprehensiveness also includes regional approaches.	♦♦♦♦♦♦♦♦♦
Clear target / message	
Support schemes must not neglect some certain technology applications, which should be supported. This is to avoid the impression that these technologies are not worth considering, and thus reducing the investor's willingness to look at these technologies. Stakeholders should be involved and consulted in the design and implementation of policies. Beneficiaries should be clearly targeted in order to avoid take-along effects.	♦♦♦♦♦
Simplicity	
Procedures should be as simple as possible, for applicants as well as for the administration, i.e. information and transaction costs should be modest.	♦♦♦
Fair amounts of incentive	
Incentives should be based on targets, e.g. market penetration. Incentives must not exceed the subsidies, but should be on a level which establishes the competitiveness of RES H at the margin.	♦♦♦
Open markets	
Standards, certifications and norms should be common across all EU Member States.	♦♦♦♦♦♦

Source: Heating and cooling from renewable energies: Costs of national policies and administrative barriers, MVV Consulting - Final Report, 2007

and up-dated with information provided in other sources and published in *Heating and cooling from renewable energies: Costs of national policies and administrative barriers, MVV Consulting – Final Report (2007)* in order to assess the policy tools supporting RES.

Assessment of selected policy tools:

- *Capital grants/consumer grants*: The high up-front investment costs will be reduced by public money. The investor has a legal claim for the subsidy independent of the public budgets. The administrative and transaction costs are low. There is still a risk for the public budget to serve all claims independent of the available public funds. Capital grants are the measure of the first choice of majority of support schemes, across all RES, followed by 3rd party finance (soft loans) and obligations. Capital grants are mainly used in the promotion of biomass-based heating applications (frequency of applied policy measures by RES). On average, they appear to support 40-50% of the eligible investment costs. Schemes of consumer grants or rebates provide their support mostly in the form of grants.
- *Tax credits*: The high investment will be partly recovered in the form of tax deductions. The tax credits range is from 20% up to 75% of the investment costs depending on the country. The investor has a legal claim for tax deductions independent of the public budgets. Most of the schemes allow for tax credits between 25% and 40%. The incentive depends on the tax rates, which are applicable by the investor. The administrative and transaction costs are low. Investors with lower tax rates should also receive an adequate incentive. There is still a risk for the public budget to serve all claims independent of the available public funds. Tax credits are the second most frequently used policy tool in the promotion of biomass-based heating applications.
- *3rd party financing (Soft loans)*: Most of the 3rd party financing schemes provide loans which are 2%-points lower than the market rate.
- *Obligations/public awareness:* These are measures without financial incentives. The administrative and transaction costs of the obligations are high. The public budget will have to be resorted to pay for the monitoring personnel. The support scheme is assessed to be less attractive, because the "burden" is with the operator / user, and less efficient, because there is no incentive to deploy more cost-efficient applications and there are the high costs of monitoring and control. Obligations are the third most used policy tool in the promotion of biomass-based heating applications.
- *Guaranteed prices /feed-in*: Every producer of RES gets a technology-specific price per kWh. The RES-H producers receive the guaranteed price through a transaction manager from traders of fossil fuels (destined for the heating energy market). The traders of fossil fuels forward the higher costs of the guaranteed price to the end-users of fossil fuels. Transactions costs are assessed to be low, but new administrative structures need to be implemented. The costs for the public budget are relatively low. It is expected that guaranteed prices will have a high impact on new investments, selection of adequate technologies, and competition.

The impact assessment as well as the comparison of RES policy tools showed that, in general, there is no single clearly favoured best practice, which could serve as a policy model to be replicated in all of the Member States. All policy measures from grants to obligations demonstrate best practice cases, and "all sector" policies, as well as sector-focused policies, can be successful. What is most important for any policy is that it needs to comply with the principles of *continuity, coherence and comprehensiveness, have a clear target / message, simplicity, fair amounts of incentive, open markets*, as is explained in Table 10.

10 Outline of the marketing tools supporting the utilization of wood as a renewable energy source

10.1 What is marketing?

There are many definitions of marketing. The better definitions focus on customer orientation and satisfaction of customer needs (www.marketingteacher.com).

In popular usage, "marketing" is the promotion of products, especially advertising and branding. However, in professional usage the term has the wider meaning of the practice and science of trading. The American Marketing Association (AMA) states, "Marketing is an organizational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders" (http://en.wikipedia.org/wiki/Marketing).

10.2 The role of marketing in relation to wood utilization as a RES

At the organizational level, marketing is a vital business function that is necessary in nearly all industries (including the energy sector) whether the organization is profit-seeking organization or a non-profit-seeking organization. For the profit-seeking organization, marketing is responsible for most of the tasks that bring revenue and profits to the organization. Both types of organizations are unlikely to survive without a strong marketing effort.

Marketing is also the organizational business area that interacts most frequently with the public and, consequently, what the public knows about an organization is determined by their interactions with the marketing staff.

The role of marketing in relation to RES utilization is, first of all, to analyse the market potential of forest biomass for potential investors (known as marketing research) and thereafter to set up the strategy or tactics. Among functions included in analysis of the market potential are the following:

- Finding the possible areas with high forest biomass potential in a chosen region or country (finding the market gaps)
- Analysis of current supply and demand for energy wood on selected RE market and their trends
- Analysis of the selected Government policy provisions for the energy wood market (including National Forest Programme)
- Analysis of the infrastructure and employment development in the selected country or region
- Comparison of energy wood products (e.g. forest chips, pellets, briquettes) by conducting a market portfolio analysis
- Comparison of biomass economics effectiveness with other competitive fossil fuels available on the selected regional market
- Barriers analysis of what could interfere with biomass utilization, e.g. technological barriers, market barriers, legislative barriers, informational barriers, economic barriers, logistical barriers, business barriers etc.
- SWOT analysis of energy wood utilization on selected RE market,
- Analysis of support policies in selected country, etc.

Nevertheless, each part of the marketing analysis depends on the available data sources and it is determined by the methodical, analytical, and practical skills of marketing researchers.

Marketing research or marketing analysis provides the basis for a process of further strategic marketing planning, which results in a strategic marketing plan. Strategic marketing planning is used to select the marketing tools for achieving business targets and to create a marketing mix or tactics for how to meet the market needs before the competitors. A marketing strategic plan has to be a part of each business plan for wood utilization as a RES.

10.3 Marketing tools

"Marketing Mix" is a term used to describe the combination of tactics used by a business to achieve its objectives by marketing its products or services effectively to a particular target customer group (e.g. forest chips produced by forest enterprises for heat and power plants or processing industry). It is also referred to as "The 4 Ps" - *Product, Price, Promotion* and *Place*, or "The 7 Ps" - The 4 Ps plus *People, Process* and *Physical Evidence* (www.cim.co.uk). These are also called marketing tools.

Businesses need to make sure they are marketing:

- *the right product to*
- *the right person by*
- *the right price in*
- *the right place and at*
- *the right time.*

Table 11 shows the marketing tools of a marketing mix and their activities. Their utilization depends on sectors of economy in which the products or services are marketed.

Evaluation of effectiveness of particular marketing tools is very difficult to do because the benefits of a marketing mix result from the right composition and usage frequency of the tools which are mixed together. The final benefit, or profit, from a marketing mix inserted into the strategic marketing plan is important.

Table 11. Marketing tools of marketing mix - "The 7 Ps" and their activities.

Marketing tools/Activities						
Product	*Price*	*Place*	*Promotion*	*People*	*Process*	*Physical Evidence*
quality, features, name, packaging, services, guarantees	list price, discounts, allowances, credit terms, costing, pricing	distributors, retailers, locations, inventory, transport, warehousing	advertising, sales promotion, public relations, direct marketing, personal selling	pre-sales and after-sales support, customer service, advisory	monitoring, quality assurance, handling customer complaints, identifying customer needs	physical presence, products tangibility, product consistency with business image

Source: www.cim.co.uk; www.homebasedbusiness.sbdc.com.au

10.4 How can marketing tools and their activities support utilization of wood as RES?

It was necessary to analyse marketing tools listed in Table 11 to select the appropriate tools and their applicable activities for the creation of an overview of marketing tools for utilization of wood as RES, and these are presented in Tables 12a and 12b. Because of the specificity of energy wood as a product for marketing, the marketing tool *Physical Evidence* has been excluded from the list of outlined tools and activities. The activities of one marketing tool can often be considered to be a part of the activities of other tools in the majority of proposed goals.

In *"Product"* each Enterprise in the Business Start-up goal is required to analyse the forest biomass portfolio and its life cycle, supply and demand for energy wood, and to be familiar with the properties of forest biomass for further processing and logistical processes. The activities of the marketing tool Product should be part of the investment project by proposing the product properties. In the Technological and Innovation goal, enterprises should purchase and utilize effective technology for forest biomass processing. There will be also a space for New Job Opportunities in new teams for project development as well as in biomass production. The results of the technical potential assessment give an overview of New Market Opportunity. The mobility platform of forest biomass as a product is related to its utilization for heating and cooling, biogas, biofuels, and electricity generation, etc. For Population, forest biomass means, for instance, the knowledge of effective ways of heating of houses and the options in forest biomass supply. For Municipalities and Institutions, Product means the utilization possibilities of wood-based fuels.

In *"Price",* each Enterprise in the Business Start-up goal is required to analyse the price ranges of energy wood and the trends in these prices in the utilization of competing substitutes, as well as the pricing and marginal costing of forest biomass products and the setting up the price strategy within the price policy. The activities of the marketing tool Price should be part of the investment project by evaluating the product's price sensitivity as well as by elaborating the scenarios by means of different price-setting strategies. In the Technological and Innovation goal, enterprises should evaluate the economic effectiveness of technological innovations. The results of economic potential assessment provide an overview of New Market Opportunities. Its Mobility platform is related to mobility effectiveness. Economic potential assessment and mobility effectiveness are both price tool activities. For Population in the goal Education, the price tool offers price evaluation assessment, e.g. costs related with travelling, teaching software or hardware, purchasing textbooks, price comparison of offering of educational courses, including possibilities for discounts, rebates, allowances or any other support for education. The price tool constitutes economic comparison of the delivery possibilities for Population and economic comparison of heating systems for Municipalities or Institutions.

In *"Place",* each Enterprise in the Business Start-up goal has to deal with the preparation of a logistical plan, building-up the start-up centres or ensuring know-how transfer. In the Technological and Innovation goal, enterprises have to establish or develop technology and innovation centres. They should also generate New Job Opportunities in the forest and energy sectors as well as in established scientific parks. In the Investments goal, it is necessary to establish research facilities. The assessment of the market potential of forest biomass is essential for Investments. Mobility means building-up of an energy infrastructure, transport of energy wood, etc. When speaking about the beneficiary Population, the goal Education means establishing of educational centres. Educational infrastructure is a marketing activity in the goal Mobility. Regional delivery possibilities of energy wood, delivery timelines and seasonality are examples of the information

given by the tool Place in the Energy Wood Delivery goal. At the level of Municipalities and Institutions, infrastructural help is the marketing activity under the tool Place.

In "Promotion", personal selling has been the most usable activity for each Enterprise in the Business Start-up goal. Recently new promotional activity in e-advertising has also become important, especially in the case of the marketing of traditional firewood, briquettes, and pellets. In the Technological and Innovation goal, enterprises have to promote their new technologies and innovation by means of a variety of leaflets and brochures. By establishing sub-regional energy centres for the promotion of wood as a RES it will be possible to generate New Job Opportunities. *Investment promotion* is a special activity for the acquisition of investors for forest biomass utilization, and it consists of several promotional activities, e.g. search missions to the energy and forest sectors, promotion events abroad, presentations, site visits. Investment promotion is organized mainly by governmental organisations, agencies for attracting foreign investments, and other such organizations (www.fdipromotion.com). Establishing of *promotion centres* could be a way to get closer to regional investors. *Promotion programmes* are targeted at the improvement and expansion of domestic RES markets, establishment of energy plantations, community-supported agriculture and forestry programmes, and other direct producer-to-consumer market opportunities. *Regional marketing* (RMS - Regional Marketing Strategy) provides a framework for enhancing the coordination and strategic focus of the region's marketing efforts in connection with energy wood mobility. The proposed *Regional Marketing Programme* will align the differences of the region with its current attributes and visions for the future (www-sre.wu-wien.ac.at/neurus/Franz_Kero.pdf). It will feature a cohesive agenda and strategy, and make more effective use of marketing in delivering the initiatives of the regional plans of forest biomass utilization. Three initiatives may be identified for the immediate development and implementation of forest biomass utilization (www.g21.com.au/library):

a) *Positioning of guidelines for individual regions* - A document outlining consistent regional positioning messages, alternative renewable resources availability (this is also the role of the Government's energy policy),
b) *Strategic and collaborative press promotions* aimed at non-industrial private forest owners, state forest enterprises, etc., and
c) *Web portal offer* for working, investing and cooperating in forest biomass utilization.

As regards population in the Educational goal of the tool Promotion, information about education possibilities or study materials for public are the marketing activities. Mobility in connection with the Promotion tool means, for instance, labour supply information or support mobility information. Information about supply and quality delivery will be useful activities in the Energy wood Delivery goal. The tool Promotion produces advertising materials for Municipalities and Regional Institutions.

The tool *"People"* in the Business Start-up goal is focused on the quality and loyalty of managing staff, workers and other staff of the so called Product Start-up Team (www.sandhill.com). Business and cooperation extension, provided by government organisations and agencies, are also activities in the Business Start-up goal. In the Technological and Innovation goal, the tool People offers technology implementation support by providers, training operational staff or technological innovative extension by companies producing new technological machines and devices. The need for certified mechanics, technical and managing staff generates New Job Opportunities in this area. Educational investments will provide more support for students, trainees, potential self-employers, and more resources for schools, teachers and educational centres. The utilization

of forest biomass and other renewables offers New Market Opportunities in regions with high unemployment rates. Due to regional differences in the supply and demand of forest biomass, education and job mobility can be expected. Population in the goal Education will benefit from the necessity of public education and from the improved qualification of teaching and training staff. For Mobility in the goal Population, it is necessary to provide help and extension for labour mobility, and these are the activities of the People tool in the goal Mobility. People in the Energy Wood Delivery goal will benefit from the activities Delivery and Service Quality. Municipalities should be prepared for renewable sources utilization by Advisory Institutions.

Under *"Process"* in the Business Start-up goal, each Enterprise should assure financial resources and their management. Business Consultancy, Coaching and Networking are also important activities in this goal (www.wfb.ch). Processes such as monitoring of trends in technologies and innovations and improving technology solutions are features of the Process tool in the Technologies and Innovations goal. The quality assurance of the service programme for new jobs offers New Job Opportunities. In the goal Investments, the maintenance and enhancement of providing investor's benefits (see financial tools) are among the essential features of the Process tool. Monitoring of market opportunities is also an important activity of this tool. The Mobility motoring programme has the following objectives (http://mobility.tamu.edu/mmp/):

a) *To monitor mobility and reliability trends* (e.g. job mobility, product mobility etc.) and
b) *To provide "proof of concept" and technical assistance* to foster local/ regional performance monitoring programmes and the supporting data collection and archives.

Accredited Training Programs are becoming very important marketing activities due to the requirements of the new EU Directives. Monitoring of Mobility and Delivery Possibilities are common marketing activities for the goals Mobility and Energy Wood Delivery. Activity Cooperation among Municipalities and Institutions of particular regions is necessary to strengthen the capacities and utilize the knowledge and experience of people from regions with different levels of expertise.

Table 12a. Outline of marketing tools and their activities for supporting wood utilization as a RES.

Beneficiary/Goal	*Marketing tools/Activities*					
	Product	*Price*	*Place*	*Promotion*	*People*	*Process*
Enterprises						
Business Start-up	Analysis of forest biomass portfolio and life cycle	Price analysis and trends in utilization of concurrent substitutes	Logistics planning	Personal selling E-Advertisement	Product Start-up Team	Assurance of financial resources
	Supply and demand analysis	Pricing and marginal costing	Start-up centres		Business and cooperation extension	Business consultancy, coaching and networking
	Understanding product features	Price strategy and price policy	Know-how transfer			
Investments	Proposing product features	Elaborating scenarios using different strategies of price setting	Research facilities Market potential of forest biomass	Investment promotion, promotion centres (agencies)	Education investments	Maintenance and enhancement of providing investor's benefits
Technologies, Innovations	Effective production technology	Economic analysis of technology innovations	Technology and innovation centres	New technologies and innovations prospects	Technology implementation support	Monitoring of trends in technologies and innovations
	Technology guarantee				Technological and innovative extension	Improving technology solutions
New Market Opportunities	Technical potential of forest biomass	Economic potential of forest biomass	Regional available potential of forest biomass	Market promotion programs	Regions with higher unemployment	Monitoring of market opportunities
New Job Opportunities	Research projects for new project teams		Scientific parks Forest sector Energy sector	Sub-regional energy informational centres	Need for certified mechanics, technical and managing staff	Quality assurance of service programme for new jobs
	Biomass production	-				
Mobility	Mobility product	Mobility effectiveness	Building-up of energy infrastructure, transport	Regional marketing	Education and job mobility	Mobility monitoring programme

Working Papers of the Finnish Forest Research Institute 121
http://www.metla.fi/julkaisut/workingpapers/2009/mwp121.htm

Table 12b. Outline of marketing tools and their activities for supporting wood utilization as RES.

Beneficiary/Goal	Marketing tools/Activities					
	Product	*Price*	*Place*	*Promotion*	*People*	*Process*
Population						
Education	Possibilities of forest biomass utilization	Price preferences of educational courses	Educational centres	Information about education possibilities, study material	Qualified teaching staff	Accredited programme of technical preparation
Mobility	-	-	Educational infrastructure	Labour supply information, support mobility information	Help and extension for labour mobility	Monitoring of mobility and delivery possibilities
Energy wood delivery	Delivery guarantee of forest biomass	Economic comparison of delivery possibilities	Regional delivery possibilities, delivery timelines and seasonality	Information about supply and quality delivery	Delivery and service quality	
Municipalities, Institutions						
	Utilization possibilities of wood-based fuels	Economic comparison of heating systems	Infrastructural help	Advertising material for municipalities and regional institutions	Extension institutions	Cooperation among municipalities and institutions

Working Papers of the Finnish Forest Research Institute 121
http://www.metla.fi/julkaisut/workingpapers/2009/mwp121.htm

10.5 Overview of the current marketing activities and their short-term and strategic long-term actions connected to wood utilization as a RES

It is essential for the forest sector to cooperate with partners from other sectors in the development of new markets and enlargement of existing markets for woody biomass, and to provide technical expertise for development of new products and for the enlargement of existing markets.

Woody biomass utilization is an issue of global, regional and local market sustainability. The markets are dynamic, changing in response to science and technology achievements, costs, perceived risks, and social and economic interests. The forest sector strives to capture opportunities and manage change in markets to help meet forest management goals.

Marketing tools in practice

Woody biomass is efficiently segregated for and productively used by a variety of new and existing markets that match local and regional supply and infrastructure needs (Woody Biomass Utilization Strategy for Restoring and Maintaining Ecosystem Health, 2007; EU Directive on the promotion of the use of energy from renewable sources, 2008).

Current Activities

- Identifying the preferences for woody biomass products through EU procurement guidelines and directives;
- Providing technology transfer information regarding woody biomass utilization to all parts of the EU through public and private forestry;
- Funding Woody Biomass Grant programmes focused on increased utilization, lower cost of treatment, increased efficiency of harvest and utilization, and expanding markets;
- Providing technical assistance to entrepreneurs and businesses in order to develop new wood-based products, as well as assistance to business striving to expand or to utilize more woody biomass products;
- Switching over from heating and cooling with fossil fuels to heating and cooling with woody biomass in some public facilities;
- Demonstrating several Fuels for Schools projects and other related large installations.

Short-term Actions

- Consulting internal and external audiences for opinions on the appropriate role of the forest sector in providing materials and services for the markets, facilitating market development, and participating in the markets;
- Evaluating and implementing actions as appropriate, opportunities for using existing policies (e.g., relevant EU Directives) to encourage new markets for woody biomass;
- Conducting feasibility studies on increased use of woody biomass and working with businesses and communities on development of bioenergy opportunities;
- Communicating the availability of technical assistance to internal and external partners to help expand and create new opportunities for the use of woody biomass;
- Assisting businesses in the development of new markets and/or increasing the supply of woody biomass products, particularly focused on heating fuels such as pellets and wood chips for commercial use.

Strategic Long-term Actions

- Expanding benefit consideration to include collateral benefits such as ecosystem services;
- Promoting the use of innovative woody-biomass products;
- Promoting diversity through expanded markets;
- Informing markets about financial incentives;
- Developing legislative recommendations that facilitate the increased use of woody biomass;
- Evaluating and improving knowledge about new technologies and/or woody-biomass products.

11 Conclusions

The mandatory target of a 20% share of renewable energies in overall Community energy consumption and the mandatory 10% minimum target for biofuels in transport to be achieved by all Member States by 2020, as introduced by The European Commission in 2008, is a fresh challenge for all Member States to adopt national actions plans and adequate measures to achieve the mandatory national targets.

Analyses have shown that in both countries, i.e. in Finland and in Slovakia, there exist vast resources of forest biomass available for energy use. Both countries have adopted some policy and marketing measures during recent period to boost the use of renewable energy sources, woody biomass in particular. However, big differences have been recognized in the level of biomass use in Finland and in Slovakia. Thus, it would be worthwhile Slovakia to analyze the policies and marketing tools used in Finland, to utilize its know-how and the lessons learned for acceleration of growth in the use of biomass for energy.

A SWOT analysis showed clear strengths and opportunities for increasing woody biomass use in both countries. However, also several weaknesses were identified, especially economic, technical and organizational aspects of marketing of biomass for energy.

As has been expressed in several EU documents, as well as in the reports from the analyzed countries, there are still some barriers to be removed. This study has identified them and outlined specific policy and marketing tools for achieving the strategic objectives in both countries.

The results of the present study will be further used in Metla's research projects in the programme focusing on the use of forest biomass for energy. It provides good guidance for decision makers in drafting the proposals for the improvement of policies and marketing strategies for the utilization of renewable energy sources for energy. The results of the present study are also good and illustrative material for the teaching process at university and vocational levels of education.

References

Akčný plan využívania biomasy na roky 2008-2013, 2008. Ministerstvo pôdohospodárstva Slovenskej republiky Bratislava, návrh, 21p.

Biomass CHP/DH – common findings of SWOT analysis VTT Processes, The Biomass for CHP/DH – "promoting further use through developing of tools and training" Work Package, 2003-2004. VTT Processes, OPET Network, summary report, 4 p.

Finnish Statistical Yearbook of Forestry, 2007. METLA Finland, 422 p.

Finland's National Forest Programme 2015, 3b 2008. Finnish Ministry of Agriculture and Forestry, Vammala Kirjapaino Oy, 48 p.

Heating and cooling from renewable energies: costs of national policies and administrative barriers, 2007. MVV Consulting for DG Energy and Transport – Final report, 72 p.

Mobilising public and private finance towards global access to climate-friendly, affordable and secure energy services: The Global Energy Efficiency and Renewable Energy Fund, 2006. Communication from the Commission to the Council and the European Parliament, Commission of the European Communities, 10 p.

National Forestry Programme of the Slovak Republic, 2007. Ministry of Agriculture of the Slovak Republic Bratislava, National Forest Centre - Forest Research Institute Zvolen, 63 p.

Prehľad možných zdrojov finančných prostriedkov, ktoré budú môcť záujemcovia o podporu čerpať prostredníctvom ministerstva hospodártsva SR v roku 2008, 2007. Ministerstvo Hospodárstva SR, 28 s.

Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources 2008/0016 (COD), 2008. Commission of the European Communities, 61 p.

Renewable Heating, Action Plan for Europe, 2007. EREC - European Renewable Energy Council, 24 p.

Renewable Energy Fact Sheet of Slovak Republic, 2007. Energy policy, European Commission, 3 p.

Renewable Energy Fact Sheet of Finland, 2007. Energy policy, European Commission, 3 p.

Renewable Energy Policy Review - Finland, 2008. EREC- European Renewable Energy Council, in the framework of the EU co-funded project: RES 2020: Monitoring and Evaluation of the RES Directives implementation in EU27 and policy recommendations to 2020, 7 p.

Report by the Slovak Republic on achievement of the indicative target, 2007. Ministry of Economy of the Slovak Republic, 6 p.

Report by Finland on implementation of Directive 2001/77/EC, 2007. Ministry of Trade and Industry of Finland, 9 p.

Správa o lesnom hospodárstve v Slovenskej republike - Zelená správa (Green report), 2008. Ministerstvo pôdohospodárstva Slovenskej republiky Bratislava, Národné lesnícke centrum - Lesnícky výskumný ústav Zvolen, Nepublikované, 115 s.

Rural Development Programme SR 2007-2013, 2007. Ministry of Agriculture of the Slovak Republic, 311 p

Stratégia vyššieho využitia obnoviteľných prírodných zdrojov energie v SR, 2007. Ministerstvo hospodárstva SR, návrh, 27 s.

Technical Assistance on the standards and codes applied to heating and cooling from renewable energies sector, 2007. MVV Consulting for DG Energy and Transport – Final report, 72 p.

The share of renewable energy in the EU, Country Profiles Overview of Renewable Energy Sources in the Enlarged European Union, 2004. Commission Staff Working Document, Commission of the European Communities, 28-32 s; 90-92 p.

The support of electricity from renewable energy sources, 2005. Communication from the Commission, Commission of the European Communities, 50 p.

Trends in the barriers to the large-scale use of forest chips in Finland, 2003. Wood Energy Technology Programme, Puuenergia, VTT Technical Research Centre of Finland, PowerPoint presentation, 22. p

Wood fuel production, 2005. For Small Scale Use and District Heating Plants, EUBIONET II - International Training Programme Joensuu, Summary Report, 17-19 p.

Woody Biomass Utilization Strategy for Restoring and Maintaining Ecosystem Health, 2007. The U.S. Department of Agriculture Forest Service, Draft version, 12-13 p.

WWW:

http://mobility.tamu.edu/mmp/
http://www.ams.usda.gov
https://www.fdipromotion.com
http://www.sandhill.com
http://www-sre.wu-wien.ac.at/neurus/Franz_Kero.pdf
http://www.wfb.ch
www.cim.co.uk
www.homebasedbusiness.sbdc.com.au
http://www.marketingteacher.com/Lessons/lesson_what_is_marketing.htm
http://en.wikipedia.org/wiki/Marketing
http://www.aebiom.org/article.php3?id_article=51
www.iea.org/textbase/pamsdb/grindex.aspx
www.tem.fi
www.erec.fi
www.aebiom.org
www.stat.fi
www.rokovania.sk
www.cres.gr/biogen/pdf/events
www.changenet.sk
http://www.ekowatt.cz/ekowatt2001
http://www.metla.fi/julkaisut/metsatilastollinenvsk/index-en.htm
www.economy.gov.sk
http://ec.europa.eu/energy/index_en.htm
http://www.finbioenergy.fi/default.asp?init=true&InitID=398;0
http://www.urso.gov.sk
www.g21.com.au/library